Apple Industry

Other Fruits and Nuts

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Introductory

APPLE growing is a demonstrated success in Oregon. It has become one of the leading industries of the State. While all varieties of deciduous fruits do well here, the apple attains a degree of excellence unsurpassed, if equalled, in any other state in the Union or in any section of the globe. So many inquiries are made concerning apple culture in Oregon that this circular has been prepared to tell of the growth of the industry as well as to tell of methods adapted by the orchardist in preparing the land, selecting and planting the trees, cultivating, pruning, spraying, picking, packing and shipping. The present state of perfection has been reached only after careful study of soil and other conditions and by the enforcement of judicious enactments making provisions for the care of trees and fruit. In the market places of the world the Oregon apple has a reputation for size, color and flavor that renders it a prime favorite and it commands the best price of any apple placed on sale. The subject matter herein has been carefully prepared. Government and State publications have been gone over carefully, with a view to incorporating in this publication such information as will be helpful to the orchardist, whether he have trees in bearing or whether he is to secure a tract of raw land and start a new orchard. If this brief treatise will serve to aid in the production of better fruit, or will be useful to the beginner, its purpose will have been subserved.

In the Beginning.

The first apple trees of the Pacific Northwest were grown in Oregon territory. They grew from seeds planted on the Hudson Bay Company's farm near Vancouver. All of the great expanse of country now embraced in the States of Oregon, Washington, Idaho and Montana was then called Oregon. It is a distinct honor, now that the apple has come into such prominence, to establish the beginning of the industry in this particular locality. The trees came into bearing in 1825. From this primeval orchard, planted by a gardener brought from Europe by the factors of the trading post, came the seeds and scions which marked the beginning of the apple industry in the Northwest. Within the next decade came the missionaries. Some of these settled near Walla Walla and others in the Willamette Valley on the present site of the city of Salem. Orchards were planted at both places in a small way.

First Commercial Orchard.

The first commercial orchard in the Pacific Northwest or on the Pacific Coast was planted a half mile north of Milwaukie, a suburb of

Portland. Henderson Luelling, while engaged in the nursery business in Indiana learned of the Oregon country by reading the narrative of Lewis and Clark. Removing to Iowa he began experimenting with a view to taking nursery stock to the then little known Northwest. In April, 1847, he left Salem, Iowa, with two wagon loads of young trees, and reached his destination some months later. He bought the squatter's right of Albert E. Wilson and planted his trees at once, not having lost one.

The trees bore fruit for the first time in 1851. The crop consisted of one box of apples, which were sold in Portland at one dollarapiece. The following year, the yield was much larger and the apples were sold at $1.50 and $2.00 per pound. The crop of 1852 and those of the two years following were taken to California and disposed of to the placer miners of the Golden State.

Early Day Orchards.

The high prices received for fruit from the Luelling orchard led to large plantings in the Willamette Valley and it is estimated that, in 1860, there were 40,000 acres in orchards in the valley. When the trees came into bearing, the yield was far in excess of the demand. Portland was then a town of about 3000 inhabitants, and the valley was sparsely settled. There were no railroads, but few opportunities to ship by water and it was impossible to market a large crop in any way. As a result, the apples rotted on the tree or on the ground, and the orchards went into neglect. Today, but few of the trees planted by the pioneers are to be seen, though here and there can be found a tree, still vigorous, bearing abundantly—a monument to the days when the industry was in its infancy.

Orchards Along the Oregon Trail.

In the Dufur orchard, fifteen miles southeast of The Dalles, are a number of seedlings—relics of the days when the Oregon trail was the only highway through this great empire. Some of these trees are thirty to forty feet in height, and in 1910 were loaded with fruit. The trees were free from disease. The apples, the variety of which is not known were large, smooth, highly colored and had a good flavor. These trees, like others along the famous highway which was traversed by the Oregon pioneer, the California Argonaut, the missionary of the cross and the red man, grew from seeds planted at times, but more frequently dropped with no thought of their springing up and bearing fruit.

In view of what follows in reference to the apple industry in Oregon the foregoing facts in connection with the planting of the fruit trees in this orchard of the continent are deemed pertinent.

Oregon Leads All Other Sections.

Oregon, in 1910, had the greatest percentage of a crop ever produced in any section. According to the report made by the Department

of Agriculture, Sept. 1, 1910, the condition of the apple crop was the best in the entire country, and the shipments made bore witness to the exactness of the department's figures. On the date mentioned the condition of the State's apple crop was given at 93 per cent. Not only is the showing made by the four western groups of states the best ever given for any group during any late period according to all records available, but Oregon orchards hold the country's championship as producing the largest percentage of a full crop ever grown in any state in any season. Out of a possible 100 per cent which will never be attained, Oregon produced a crop of 93 per cent.

Growth of the Industry.

Thirty years ago there were more apples grown in Oregon than there were during 1910. The plantings from the Leuelling nursery had come into bearing. The Willamette Valley was at that time the principal apple-growing region of Oregon. The yield, though larger than last year's, did not compare with it in quality. The growers did not specialize and they did not bestow the attention on the trees that is given them today, and that is a prime requisite in the production of first-class fruit. The first trees planted in the Rogue River Valley, a few of which are still living and bearing fruit were set out shortly after the plantings first made in the Willamette Valley, Not until 34 years after the first fruit trees were brought into the valley were the older commercial orchards planted. These were few in number. Then came a lull in the industry and no further plantings were made for ten years. Then came the beginning of great things in apple culture. Alfalfa and grain fields were turned into orchards, wooded areas were cleared and in turn planted to profit-producing fruit. There are now over 65,000 acres planted to apples in the valley. About 5000 acres are in bearing. The entire area will be producing largely in less than a decade.

About the same time that so many orchards were planted in the Willamete Valley, between 1850 and 1860, trees were set out at Hood River. The first commercial orchards were set out in 1893. Sears & Porter planted three acres to the Ben Davis variety. In the same year E. L. Smith and Chris. Dethman set out 30 acres of different varieties. It was nearly ten years later before Hood River apples became noted for their excellence. In 1900 a New York commission house had a buyer in the Northwest. He visited Hood River and contracted for all the merchantable fruit. When it was put on the market in New York it created a demand that surprised the buyers. They did not want their competitors to know where the fruit was grown. They effaced the Hood River label and the product was sold as Oregon apples. Since then other buyers have been in the field and the district in which the famous apples were grown gets full credit for its product. In 1910 there were 12,000 acres planted to apple trees in the Hood River Valley, with 1200 acres in bearing. Shipments up to January 4, 1911, were 710 cars. The 1910 crop was 800 cars.

The Milton-Freewater district in Northwestern Oregon has some 1700 acres in bearing, with 1200 acres set out to young trees.

There are approximately 1500 acres set to apples in Baker County, with about half the number in bearing. These are not all commercial orchards, but the plantings are now being made with the commercial factor in view.

The Willamette Valley has hundreds of acres in bearing and other hundreds set to young trees.

The Rogue River and Willamette Valleys, the Columbia River Basin and the Milton-Freewater District are the present large apple-producing districts of the State. Oregon has no law providing for the collection of horticultural statistics, and figures as to the number of trees in bearing or the number of acres set out are not obtainable.

Within the last ten years large areas have been planted at The Dalles, and the older orchards there yield a quality that is unsurpassed. What is true of The Dalles is equally true of Mosier. These places are in the same belt as Hood River and their products are similar. Dufur, in Wasco County, presents splendid openings for engaging in the growing of the apple, provided varieties suitable to the locality are selected and the requisite care is given the orchard. It must be kept in mind that there is no other fruit grown that requires so full and complete knowledge of detail to bring it to the highest degree of perfection. General principles will apply everywhere, but there are local conditions and methods of practice that must be mastered and can be acquired only by close observation and experience.

Where Fruit Is Sold.

The world is the market place for the Oregon apple. It is in demand everywhere. Up to 1910 the Hood River Apple Growers' Union sold practically all of its crop to one man in one city, New York. In the year 1910 this union sold its crop to 24 different states, 65 different cities and 87 different buyers. The foreign demand increases with each year, and the Newtown Pippin (known in England as the Albemarle Pippin) is in high favor in Great Britain. It is not too much to say that Oregon apples go to every foreign market in which American products are sold. Buyers for New York houses visit the State each season and are in the market for the apple crop. They pay good prices—prices which create consternation among eastern growers, where a bushel box of the Oregon product sells for more than a barrel of home-grown apples.

Demand Greater Than Supply.

The question is often asked, Is there not danger of over-production? It may be unhesitatingly answered in the negative. Colorado, California, Utah, Montana, Idaho, Washington and Oregon shipped less than 15,000 cars in 1910. With an average of 600 boxes of one bushel each to the car, this would make the entire shipment total 3,000,000 barrels. In other words, the states mentioned are growing one-eighth to one-tenth of the quantity grown in the United States. The apple crop for the entire country for the first 15 years is as follows:

Year.	Barrels.
1895	60,540,000
1896	69,070,000
1897	41,556,000
1898	28,570,000
1899	37,560,000
1900	47,960,000
1901	26,970,000
1902	47,652,000
1903	45,000,000
1904	45,300,000
1905	23,500,000
1906	38,000,000
1907	29,069,000
1908	25,500,000
1909	25,415,000
1910 (estimated)	23,825,000

The population of the United States is rapidly increasing. The apple is growing in favor. It is a recognized necessity in the home. Its healthful qualities commend it and its appetizing flavor will market it in still greater demand.

Orchard Cost and Revenue.

Following is a conservative statement as to cost of setting out an orchard, care of trees until they come into bearing, expense of marketing and price received, prepared by an orchardist of Wasco county:

At what price can first-class fruit trees be purchased?

First-class apple trees can be purchased at from $15.00 to $20.00 per hundred.

Are the trees that are first planted one year old?

Yes, do not plant anything older than a one-year top on two-year roots, for a nice top cannot be formed on older or larger trees.

How many trees are planted to the acre?

Plant 55 apple trees on the diagonal 30 feet apart on the acre, 80 trees on a triangle, 25 feet apart; we plant 30 feet altogether on a triangle.

What is the cost per acre to have an orchard planted by one who is capable and qualified?

To prepare the ground, dig the holes, furnish and plant the trees and cultivate them the first year will cost $20.00 per acre.

What is the average production per acre of trees six, seven and eight years old?

Six-year-old trees in good condition will bear from 50 to 150 boxes per acre; seven-year-olds, from 100 to 200; eight-year-olds, from 200 to 400.

What is the average price per box of fancy apples?

Apples, like all other products, are governed in price by supply and demand; fancy apples are now worth from $1.50 to $2.00 per box.

What is the expense per acre of caring for a 10-acre orchard of from one to six years old?

It will cost about $6.00 for the second year with an addition of about $1.00 per acre per year on account of spraying, pruning, etc.

What is the expense of marketing an apple crop—including picking, packing, hauling to market, etc.?

It is figured that from the time the apple is on the tree until it gets to the depot will cost on an average of 50 cents per box; the cost of shipping will depend on where they are shipped to.

What market gets most of the apples produced in this country?

Most of the apples grown here are sold in the United States. There is growing demand in foreign countries, and no danger of over-production.

What further care is due the orchard after the crop is harvested?

After the crop is harvested the next thing is to spray the trees if they require it—and the next is the pruning and spraying in the spring.

Is irrigation necessary, and have any failures occurred on account of lack of rainfall, frost, or other causes?

We do not irrigate, although we could if so desired. We have plenty of rainfall to produce all kinds of crops. Our first frost comes in October and we sometimes have them as late as April. Spring generally begins in February, with frequent and good rains in May and June. We have considerable rainfall in winter. The average annual rainfall is 15 inches.

Summary of what a ten-acre tract ought to do in ten years:

We have found that it will cost $60.00 per acre to maintain a 10-acre orchard for the first 6 years and $48.00 for the next 4 years—or until the orchard becomes 10 years old, making a total of $108.00 per acre, or $1,080.00 for the ten acres for 10 years. The trees at 5 years old should bear one-quarter box of apples per tree; at 6 years old, three-quarters box; at 7 years old, one and one-half boxes; at 8 years old, three boxes; 9 years old, four and one-half boxes, and at 10 years old, six boxes—making a total of 16 boxes per tree up to and including the 10th year. Figuring the apples at $1.50 per box (which is from 50 cents to $1.50 less than they have ever sold for) and allowing 50 cents per box for harvesting and delivering to depot, will net us $1.00 per box, or $16.00 per tree. We now have, say 45 bearing trees on each acre out of the 55 planted. This will bring us 720 boxes, or $720.00 per acre, or 7,200 boxes or $7,200.00 net for the 10 acres in 10 years for the investment.

Price of Orchard Land.

The price at which orchard land may be bought varies according to location. Following are prices quoted in literature sent out by commercial organizations in the different districts:

Rogue River Valley.—First-class fruit lands cleared and ready for trees within a few miles of Medford, $250 to $500 per acre. Further from the city, but on main highways, land can be bought for from $50 per acre upward.

Willamette Valley.—In the neighborhood of Salem, land cleared, fenced and under cultivation can be bought for from $40 to $100 per acre. Orchard land set to young trees sells for from $200 per acre upward. The cheaper-priced lands are adapted to fruit growing.

Columbia River Basin.—In the Hood River Valley some unimproved land can be bought for less than $100 per acre. Values for raw land vary according to location and cost of clearing, the prices ranging from $100 to $400 per acre, while the average is about $150.

The Dalles.—Fruit lands (land ready to plant) sell for from $50 to $150 per acre. Apple lands set out to young trees may be had at $200 per acre.

Eastern Oregon.—In Baker County land values range in price from $35 per acre upward. In Grant County hill lands sell for from $12 to $25 per acre, improved bench lands $35 to $60 per acre and bottom lands $50 to $125 per acre.

Prices in certain localities may seem high to those unacquainted with the revenue derived from the lands. There are orchards in Oregon for which as high as $4000 per acre have been refused. The owners of these are justified in refusing such an offer for the reason that their apple trees are netting them 10 to 15 per cent on that valuation. These lands were at one time forests. Their present value has been brought about through persistent and intelligent effort. There are thousands of acres of forest land in Oregon today which may be acquired. The clearing will necessitate the expenditure of labor and money, but the end is worth striving for. The days of pioneer work are not yet passed. There is just as good land in the virgin forest at this time as that which is quoted as having a value of $4000 per acre.

The State is a large one. Figures given show values in certain of the fruit-growing sections. Prices of land will vary and some sections are more productive than others.

PROFITS IN APPLE GROWING.

Rogue River Valley Orchards.

Medford.

From 8 acres 6000 boxes of Newtown Pippins were marketed from the Hopkins orchard, netting $2000 an acre, f. o. b. the orchard. For seven years the orchard netted an average of $791 per acre.

Twelve acres of Newtown Pippins netted f. o. b. orchard $1170 an acre. Seventy-one Ben Davis trees yielded 700 boxes of fruit which sold on the ranch for $1 per box. One acre of 6-year-old Newtowns netted $711. One hundred and fifty-two trees of Yellow Newtown Pippins on a three-acre tract netted $3125 f. o. b. Medford.

C. R. Heimroth sold from one and three-fourths acres of Spitzenburgs 587 boxes for $1,174; from three acres Newtown Pippins, 780 boxes, for $1,365; total, $2,539. This in addition to sales of culls. All in 1906.

The Bradshaw & Stevens orchard contains three and one-half

acres, 250 trees, Yellow Newtown apples, which annually bring returns of $2,500 to $3,000.

W. H. Norcross sold from two acres of Newtown Pippins, not yet in full bearing, 1906, 657 boxes for $1,346.85. The same year, from four acres of Spitzenburgs, $2,113.10. This orchard has borne eight good crops in nine years, and the carload of Newtowns sent to London from this orchard in 1906 was pronounced by the dealers to be the best car of the year in that market.

S. L. Bennett has but one and one-half acres of Yellow Newtown Pippins, but he has received a comfortable living from them for years past. In 1906 he received from this little orchard 731 boxes of fine fruit, bringing him in $1,388.90. This, in addition to sales of culls.

Twenty-two acres of pears on the Burrell Investment Company's orchard in 1906 produced 6,441 boxes of fruit, which sold for $8,884, f. o. b. cars.

J. G. Gore received from five and one-half acres of Newtown Pippins $4,252 f. o. b. here. In addition, he sold something over $500 worth of culls. His little orchard has yielded fully as good crops several years in the past.

The Mountain View Orchard at Talent yielded this Fall 13,500 boxes of Newtown Pippins. Twenty-three acres yielded 12,000 boxes which will net $2 a box or over $1,000 an acre. So far as sold, the Newtowns have netted $2.25 a box. One tree yielded 57 boxes, a record yield for any section. Twenty-eight Gravenstein apple trees yielded $600 worth of apples, the crop being 450 boxes, an average of over 16 boxes to the tree, or over $21 per tree. One tree of Gravensteins yielded 35 boxes; three and a half acres of Winesap and Spitzenburgs yielded 1,500 boxes of apples, selling for $2 a box net, or $3,000—an average of $880 an acre.

Tronson & Guthrie, from five acres of 16-year-old Spitzenburgs, picked 2,700 boxes of apples, averaging 540 boxes to the acre, which netted them an average price of $3 a box, or $1,620 an acre. In addition, they secured $1,100 in prizes at Spokane and $3.40 a box for their prize Spitzenburg apples. The lowest price received was $2.50 a box net. They secured $1,000 sweepstakes, first prize, for carload of Spitzenburgs; first prize, $100, for best three box display of apples. Last year they averaged $2.47 a box.

R. C. F. Astbury, from 500 trees on his Riverside orchard, near Gold Hill, has marketed four cars of Spitzenburgs and Ben Davis, principally the latter, which has grossed him $5,000, or a net profit, deducting all expenses of operation, of $3,000.

From 18 trees of Newtowns on the Western Oregon Orchards tract, comprising 2100 acres, over half of it in young trees, said to be the largest orchard in the Northwest, Manager J. A. Westerlund picked 93 boxes of apples, for which he received $1.80 per box net. The trees are seven year sold. The greatest yield for any one tree was seven boxes, which netted $12.70. The average yield per tree was five boxes and the average return per tree was $9.45. He exhibited Newtowns at Spokane and Denver, which were awarded first prize at Denver and second at Spokane.

S. L. Bennett, from one and a half acres of Newtowns, picked 700 boxes, at on average price of $2 a box or $930 an acre. From the same orchard a year ago Mr. Bennett picked 2,200 boxes, which netted him $2,100 per acre.

A. Conro Fiero has a two-acre orchard of mixed varieties from which he marketed 1,200 boxes of apples, netting him $2,500. His total expense of labor and operation was under $500.

Colonel R. C. Washburn picked eight cars of apples from ten acres of his Table Rock orchard, consisting of Newtowns, Spitzenburgs and Winesaps. Two hundred and forty trees of 6-year-old Winesaps yielded 1,200 boxes, which netted him $2 a box. His Winesaps are extra large, running 72 to the box.

J. C. Pendleton, of Table Rock, reports from his family orchard, consisting of 38 21-year-old trees, covering two-thirds of an acre, for the year 1909. Nine Spitzenburg trees yielded 82 packed boxes, sold for $3 per box, net, $246; from 29 Yellow Newtown Pippins, 301 packed boxes, at $2.50 per box, $752.50; culls, 60 cents per box, $24.25; total receipts, $1,022.75. Cost of spraying four times, $33; cost of boxes, $42.60; cost of wrapping paper, $21; cost of packing, $23; extra labor hired, $18; total expense outside of own labor, $137.60. Net receipts off of two-thirds acre, $885.15.

From 7 acres of Newtown Pippins, near Ashland, A. D. Helms marketed $9,100 worth of apples, or $1,300 per acre. In 1907 his yield was $16,000. The yield in 1905 was $7,800; in 1904, $4,500; in 1903, $6,500. This orchard on foothill land has never had a crop failure.

Ashland.

All varieties of apples do well at Ashland, but experience and popular favor have largely confined production to two varieties for which there is heaviest demand. These apples are shipped from this valley every fall in carloads. Four and a half tier "Newtowns" from Ashland have sold in London for prices which netted the grower $3.60 per box, the freight charges from Ashland being $1.06½ per box.

The gross receipts from an orchard of eight acres, six miles south of Ashland, were for a period of seven years, $28,800. An average of $4,114.28, or $587.75 per acre. Later results bring the average up to $684 per acre for eight years.

Profits from Eight Acres of Aples During One Season.

Produced 6,000 boxes Yellow Newtown Pippins at $2.50....$15,000.00

Expense.

Labor, one man for one year	$1,000.00	
Extra labor	200.00	
Spray material	200.00	
Picking	500.00	
For boxes	720.00	
Paper and wrapping	400.00	
Packing	400.00	
Hauling	300.00	— 3,720.00
Net profit		$11,280.00

This year the net profit will run considerably over $12,000, the exact amount not being known, as all fruit is not yet out of the orchard.

Grants Pass.

"Seven years ago we leased a badly neglected and unprofitable Orchard of 35 acres, the varieties being mostly Yellow Newtowns and Spitzenburgs. Up to 1901 the orchard had been unprofitable. We spent the first three years in growing new tops to our trees. In 1904 we sold the apples from this orchard for $12,000. In 1906 we harvested 14,000 boxes which sold at from 75 cents to $2.25 per box f. o. b. Grants Pass, Oregon, and from now on this orchard will produce from 400 to 600 boxes per acre. Some of the best acres have heretofore produced 1,000 boxes per acre. The commercial orchards, on an average, throughout this valley will produce from 400 to 600 boxes per acre. The average price of the Yellow Newtown and Spitzenburg apple has been up to this time $2.00 per box f. o. b. Grants Pass. Other varieties, such as Ben Davis, etc., $1.25 per box. It costs 50 cents per box to grow and put them on board cars.

"We started with less than $500.00 capital, leasing the orchard three years, at the end of which time we purchased it and 215 additional acres of undeveloped land for the sum of $23,000. In 1906 we planted 120 acres of apple, peach and pear trees, making nearly 150 acres in orchard. In 1908 our attention was drawn to other business and thinking we would dispose of the orchard, subdivided it into five tracts, including the 35 acres bearing orchard, which was sold to Messrs. Shank & Hall for the sum of $34,000. The holdings which we disposed of are at present worth $75,000 on the market."—Eisman Bros.

J. D. Lindsey picked 750 boxes of apples from one and one-half acres, for which he received from $1.25 to $1.75 per box.

R. M. Robinson, from four acres, picked 3,000 boxes and sold them for from $1.25 to $1.75, most of them at the higher price.

Mr. Scoville picked sixteen boxes from one tree eleven years old and sold them at from $1.25 to $2.00 per box.

Benton County.

There is a forty-acre apple orchard in Benton County that has for the last three years averaged for the entire crop $1.70 per bushel box. This orchard is fourteen years old and many of the trees bear twenty-five bushels of apples each with unerring regularity year after year.

Yellow Newtown Pippins grown in an orchard situated one mile from the city sold last year for $2.75 per bushel box f. o. b. Corvallis.

The orchardists in the vicinity of Corvallis have never been able to supply the demand for first-class stock, and the demand is increasing faster than the supply. The Yellow Newtowns, Northern Spies, Spitzenburgs, Kings and Jonathans, are not excelled anywhere. These apples are grown entirely without irrigation.

Willamette Valley Orchards.

We sold $10 worth Northern Spy apples from one tree last fall.—Albert Rowland, Rt. 6, Salem.

From three acres of apples we sold over $500 worth last fall. The crop was not quite an average.—A. L. Godfrey, Rt. 8, Salem.

I finished picking my Virginia Greening apples in good condition on January 13, 1908.—F. G. McLench (Polk County) Rt. 4, Salem.

I believe there is no better section in the West, all things considered, for raising apples than the Willamette Valley.—C. A. Park, Commissioner Second District, State Board of Horticulture.

Our yield of apples in the Wallace orchard in 1906 was 15,000 boxes on 46 acres, or 333 boxes per acre.—C. A. Park, Supt., Salem.

Our 15-year-old apples yielded from 10 to 18 bushels per tree. Got 18 boxes merchantable apples from one tree 10 years old.—Clinton J. Kurtz, Salem.

I have three acres of apple trees which brought me $452, besides family use.—Peter Kurre.

Harvested 3300 boxes apples in 1907 from eight acres.—L. T. Reynolds, Rt. 9, Salem.

My apples brought me $100 per acre.—M. Lunde, Salem, Rt. 6.

Good trees, with proper attention, will pay the orchardist. In 1909 I picked 200 boxes of apples from twenty trees and from 165 boxes as they came from the orchard we packed ninety-one boxes of fancy and thirty-two boxes of choice apples. My trees averaged $8 per tree each. This season I have sold over $5 worth of crab apples from one tree, besides supplying two or three families with all they wanted for use in their homes.—G. W. Waldron, R. 2, Box 137, Oregon City.

Hood River Orchards.

From 150 five-year-old Spitzenburg trees covering slightly over two acres, J. O. Mark harvested 183 boxes of apples, which sold at an average price of $2.96 per box. The return on these young trees was $548 and his net profit per acre could scarcely have been under $200. According to the figures of A. I. Mason, he had with the crop produced in the eighth year received back with interest all the money he had invested in a block of Newtowns and Spitzenburgs. If careful estimates on the yield this year from these trees, which are now in their thirteenth year, are correct, Mr. Mason will have realized a net average profit of $500 per acre annually during the five years since the orchard had paid for itself. The returns received by James Lacey for fancy fruit alone from a three acre orchard were as follows for a period of four years: 1906, $1,764.20; 1907, $3,801.36; 1908, $2,493.41; 1909, $2,367.71.

E. H. Shepard, Hood River, from 160 trees on one and three-fifths acres in 1907 received gross returns of $2,042.35, which, after paying all expenses, left him with net profits of $1,400, or more than $900 per acre.

From a block of 346 trees, variety Newton, planted 1896, we have sold over $22,000 worth of fruit. Rae & Hatfield, New York, contracting same in 1904-5-6-7-8-9; Davidson Fruit Co., Hood River; Page & Son and Bell & Co., Portland; W. N. White, New York, also buying in car lots.

A block of Ben Davis, 297 trees, planted at the same time, have

yielded over $12,000 worth of fruit. Trees in these blocks are planted 108 to an acre. The alternated trees in block 346 was 240 bearing in 1909, some of which bore 34 boxes. The sales from this lot in 1909 amounts to over $4,000—J. C. Porter, Hood River, Ore.

In apples, Hood River has further specialized in growing Spitzenburgs and Yellow Newtowns. ninety per cent of the trees in the valley being of these two varieties, which bear the highest pomological society ratings and command the highest prices. The Spitzenburg brings a slightly higher price, but the yields of the Newtowns are slightly larger. There is no district in the world which will produce these varieties in greater perfection than that attained in Hood River. The Ortley, Red Cheek Pippin, Winter Banana, Jonathan, Baldwin, Arkansas Black, Delicious, Winesap, Northern Spy, Hyde's King and Ben Davis are grown in Hood River and have been awarded prizes in open competition. These varieties are very profitable, as is demonstrated by the fact that 297 trees of the last named variety, covering 2¾ acres, planted in 1896 in the Sears and Porter orchard, yielded $12,000 in three years.

Mosier.

Mr. Carroll, from his apple orchard, on the hills south of town, sold his Yellow Newtowns at the rate of $1 079.50 per acre gross—and after deducting all expenses, including full wages for himself and team, the net profit amounted to $834.62 per acre, from trees that averaged but eight years old (the oldest being only nine years).

Sgobel & Day, commission merchants New York City advise that "The first carload of Mosier apples sold at $4.25 per box for 80 size, and $4.00 per box for 88 and 96 size."

"There were some Baldwins in the car that were the finest Baldwins we ever laid eyes on."

Steinhart & Kelly, commission merchants, New York City, write:

"Mosier Fruit Growers' Association, Mosier, Oregon:

"Gentlemen—We beg to advise you that we this day received your first car, No. P. F. E. 4393, and want to compliment you on the pack and the selection of the fruit. The car was eminently satisfactory to us, and we were very much pleased with it.

"Particularly do we want to compliment you on the pack of the Spitzenburgs. They were certainly very good. The sorting was excellent and the pack was simply perfect. We don't think anybody could improve on it."

Mosier Fruit Growers' Association:

Regarding carload of apples: "This carload has been received and a check mailed to you for same—in full—and we have absolutely no complaint to make regarding any apple in the car. The pack is first-class in every particular, and we thank you very much for your treatment of us. Yours very truly,

(Signed) "A. GALLI FRUIT COMPANY,"
San Francisco, California.

The Dalles.

F. O. Brace: "I have five acres in apples. About half of my trees are young. My old trees will yield from 15 to 30 boxes to the tree and will net $3.50 per box. These are Spitzenburgs. My prunes netted me 80 cents per crate. I also sold $250 worth of cherries this season. I refused an offer of $3000 per acre for my apple orchard here."

C. L. Hazen, Route 2, The Dalles: "I have 2½ acres in apples. My ten-year-old Baldwins will yield 18 boxes to the tree. They net me $1.75 per box. My Spitzenburgs and Newtons net me $3.00 per box. We spray five times and it costs us $4.00 for each spraying in addition to the cost of material. I have 14 acres in orchard. My Italian prunes were shipped green to New York, and netted me 88 cents per box."

Dr. G. E. Saunders: "I gathered 500 boxes of Spitzenburgs, Winesaps and Newtown Pippins from 50 trees."

A. J. Anderson: "I picked 580 boxes of apples from trees on one and one-half acres. The fruit netted me $400."

George Bunn: "I gathered 32 boxes of apples from three trees, which I sold for $38.00."

J. C. Hostetler: "We have 37 acres planted to apples. There are 1050 trees in full bearing. We packed for shipment in 1910 6000 boxes."

E. Hendershott: "We are going in for apples. Last Spring (1910) I set out 500 trees, principally Winter Bananas, Jonathans and Ortleys." (It is interesting to state in this connection that Winter Banana apples sold in Portland in the Fall of 1910 at 5 to 7 cents each).

In General.

H. B. Herr, Freewater, Umatilla County, Oregon, from three acres of young Rome Beauty apple trees cleared $1,615.

Mr. Wydeck, Freewater, Umatilla County, Oregon, sold the fruit from one acre of Rome Beauties for $1,100.

At Talent, Oregon, there is a Newtown Pippin tree that produced 57 boxes of apples, selling for $2.25 a box net at the orchard.

From his 17-year-old Spitzenburg orchard near Central Point Ore., W. H. Norcross averaged 420 boxes to the acre, which brought him $2.50 per box f. o. b. orchard, or $1,050 per acre. His 15-year-old Newtown Pippins produced 592 boxes to the acre which sold at the orchard for $2.40 per box, or $1,420.80 per acre.

J. A. Wuest, of Portland, who has an orchard in Hood River exhibited a Gloria Mundi apple weighing 38 ounces at the Hood River apple fair.

J. W. Merritt, of Central Point, picked from his three-acre apple orchard in one season, 3020 boxes of apples. From 52 Newtown apple trees he sold apples which netted him that year $1747. As these 52 trees were set very close together, an entire acre bearing at the same rate would have brought returns that year of $2450.

Other Crops in the Apple Orchards.

The question is often asked, what can be done toward making a living from the orchard land while trees are coming into bearing? There is difference of opinion concerning this. In some districts, orchardists assert that the land between the rows will provide a good living for a family. In the Hood River district for instance, they specialize in strawberries (Clark's Seedlings). Most of the berries are grown between the rows in your orchards and the plants are plowed up, as a rule, after the fourth year. The berries open up at $5 and $6 per crate and steady down to make an average of $2.50 to $3.00 for the season. The crop runs from 100 crates per acre upward. The cost of producing and marketing is about $1.00 per crate. In other sections berries, vegetables and corn are grown. The statement is made that these inter-crops will yield returns sufficient for a living. We suggest that inquiry be made along this line by the prospective orchardist. He is the one whose welfare is to be considered. We do not want to make any statements which cannot be substantiated. Oregon apple lands are remunerative, and until trees come into bearing there are sources of employment open to the newcomer. There is work to be done in planting, cultivating, pruning, spraying, picking and packing. There are lands to be cleared for planting. There is fuel to be hauled. The resident who wants work is given preference over the non-resident. Even if the orchard land does not provide a living during the first four years following the planting of the trees, there are other means of obtaining a livelihood. It is worth some sacrifice to acquire an orchard where they are sources of such profit.

Some Words of Advice.

Do not make a purchase of apple land from any person about whose reliability you are in doubt. Every reputable dealer in Oregon can satisfy you as to his standing.

Do not pay for land until you know to a certainty as to its location. Transportation cuts a big figure in the marketing of orchard products.

Do not expect as large returns from an orchard cared for by some one else than the owner. Every owner gets more from his holdings when he gives them his personal attention.

Do not expect your trees to become profitable unless they are given proper care.

Do not fail to read the statements made by apple growers as to profits. There is money in the business for any one who will conduct it along intelligent lines.

Do not say that Oregon apple lands are too high priced until you have satisfied yourself as to the revenues derived.

Do not forget that prices of land vary according to soil, location, transportation facilities, nearness to market, etc. Write to the Portland Chamber of Commerce and you will be put in touch with any section of Oregon which appeals to you. Literature telling of the different sections, the price of land and all about what can be done in apple growing is available in most places.

Planting the Orchard.

The selection of an orchard site is not governed by any arbitrary rule. Some kinds of soil and surface presentations are preferable to others as they are better adapted to this fruit and require less expense in preparation and in the after care of the orchard. The most intelligent and experienced orchardists differ as to the best location and exposure of an orchard, some preferring a northern slope, others an eastern, and yet others recommend a southern or even western slope. It is believed that the advantages preponderate in favor of a gentle eastern or northeastern slope, as orchards located on such sites suffer less in both soil and tree from the effects of heat and drought. An orchard with such an exposure will maintain its vigor and longevity better than if inclined to the west of southwest.

Soils.

Apple trees will thrive and do well on almost any soil which is well prepared, but the different kinds of soil may require different treatment and after care. A loamy soil is naturally rich in plant food; hence it will need little, if any, manuring in its preparation. But it shoud be deeply stirred and thoroughly broken up by subsoiling. This loamy soil is what may be termed free soil, as it seldom becomes compact, even by abusive treatment. A clay soil is the most difficult to prepare, and often it requires manuring, as well as thorough plowing replowing and subsoiling. It should also be frequently stirred during the Summer months, and especially as soon after each rainfall as is practicable, to prevent it from baking and becoming compact. Sandy soils are generally lacking in the necessary plant food. They also have the objection of losing such fertilizers as may be added by the leaching effect of the rainfall.

The wood growth on loamy soils will be strong and vigorous, but may not be sufficiently mature to withstand the frosts of a rigorous winter. This will not be applicable to most of the present fruit districts of Oregon, where extremes in temperature are rare, if not unknown. Clay lands are not apt to produce such vigorous growth, and orchard trees on such lands will be hardier as to Winter killing than on most other soils. With a free subsoil underlying it, a loamy clay soil will probably yield the best results, especially if it be well prepared by thorough culture and subsoiling before planting the trees. Timber lands, or lands on which forests have formerly grown, if having the proper exposure and drainage, are preferable for orchard sites. Such lands contain the elements of plant food necessary to insure a good and sufficient wood growth and fruitfulness. Fruit growth on such lands will rank first class in size, quantity and appearance.

Drainage.

All orchard lands should be thoroughly surface drained and under drained. No orchard can endure for a great length of time with stagnant water either on the surface or within the soil. All surplus water

from excessive rainfall or from other causes should be promptly removed by either surface or sub-drainage. If the natural formation of the land does not afford such prompt drainage it must be provided artificially. Surface ditches or furrows between the rows of trees may afford temporary drainage, but they are objectionable on other accounts that will be apparent; for an orchard thus drained will be difficult to get over in its necessary case and in gathering and handling the fruit.

Under drainage is far better on these accounts; besides it is much more thorough, especially if accomplished by means of well-laid tile. A thorough breaking up of the subsoil will afford temporary drainage in a stiff clay soil, but in a few years the soil will again become compact, when it will require restirring. But in all cases the planter must be the judge of the special drainage requirements of his soil and location.

Use of Fertilizers.

The soil constituting the proposed orchard site should be carefully studied, and if found to be lacking in the essential elements of fertility necessary to maintain a fairly vigorous wood growth, fertilizers should be added before plowing, that they may become thoroughly incorporated with the soil in preparing the land for planting. Scientists and practical orchardists are generally agreed on the great value of well-rotted barnyard manure for an apple orchard. It not only supplies humus but it contains a large per cent of other necessary nutritive elements for maintaining health, vigor and fruitfulness of trees and for the development of the proper qualities for a fine fruit product. But as the stock of this sort of manure is not always sufficient for the general demand, other agents will have to be resorted to, and next in value and in a concentrated form are unleached wood ashes, which will supply, to a great extent, the elements necessary to plant growth. It is maintained by some authorities that one ton of unleached wood ashes contains as much plant nutriment as five tons of ordinary barnyard manure; therefore, whenever obtainable, ashes should be used in preferance to any other fertilizer.

Manufactured Fertilizers.

There are many kinds of manufactured fertilizers, some of which are valuable only for special soils or special crops. It is difficult to determine what fertilizer it is the best to use without knowing what elements are lacking in the soil. The three elements most commonly needed by soils are nitrogen, potash and phosphoric acid; and chemical fertilizers that contain the largest percentage of these substances in available form will be the most valuable. A fertilizer containing $1\frac{1}{2}$ to 2 per cent of nitrogen, 7 to 9 per cent of available phosphoric acid and 10 to 12 per cent of potash will give excellent results when applied to orchard land in quantity ranging from 400 to 600 pounds per acre.

Growing of Clovers.

Western lands as a rule are generally sufficiently fertile for an orchard growth and need no enriching until the trees begin to show signs of weakness in vigor from crop bearing; and even then they may be invigorated by the use of crops of red or crimson clover grown among the trees, allowing the crop to fall and decay upon the ground each year. By this treatment a large amount of decaying vegetable matter, rich in plant food, will accumulate upon the land forming a protection from the heat of the sun and preventing deep freezing during the winter, a condition conducive to the health and vigor of the trees. All lands lacking in humus can have this element restored to a great extent by such treatment, and orchards which have been sown with red clover maintain greater longevity, fruitfulness and excellence in fruit product, besides dispensing with the costly necessity of using special fertilizers.

When Trees Should Be Aided.

As to the indications when a bearing orchard needs stimulating, the eminent pomologist, Doctor Warder, once said: "When the growth of the terminal branches fails to make an annual extension of at least one foot in length, the tree should be stimulated by manuring the land and giving it thorough cultivation."

Preparing Land for Planting.

The principal requirement in preparing land for planting an orchard is deep tillage, and the more thoroughly the work is done the more certain is success. The preparation had best be done late in the Fall, so that the land will be ready for early Spring planting, or for Fall planting, if preferred. Many successful orchardists plow the ground in "lands" so as to make an open land furrow where each row of trees is to be set, and then, after the trees are planted, to back furrow the ground so as to make lands with tree rows in the center. This method affords a deeper tilth under the trees, and at the same time surface drainage into the open land furrows midway between the rows which will receive and, if properly graded, carry off any surplus water which may accumulate from heavy rainfall.

Distances for Planting.

A decision as to the proper distance apart to set the trees varies with different planters. Some plant 16 by 32 feet—that is the trees 16 feet apart in rows 32 feet apart. The object of this method is to obtain a crop from the trees until they begin to interfere with each other, when every alternate tree in the row is cut out, leaving the trees in the entire orchard at a distance of 32 feet each way. The trees to be cut out should be early bearing, short-lived varieties. The system has the advantage of more fully utilizing the land for fruit production until the thinning out becomes necessary. Other planters adopt a distance between trees of 20, 24 or 30 feet apart each way, claiming that by the time the trees interfere with each other they will

have finished their growth and the orchard will begin to decline. But it is generally conceded that 32 to 40 feet is the preferred standard distance. If the distance of 40 feet each way is adopted, it will afford ample space between the rows for growing any crop which requires cultivation, such as corn, beans, potatoes, etc. Such cultivation is highly important and necessary for the maintenance of moisture in the soil and for the health and vigor of the trees. This distance will afford free circulation of air and abundant sunlight, both of which are essential to the growing of well developed and highly colored fruit. Small grain should never be grown among fruit trees, especially when the orchard is young.

Season for Planting.

The question as to the best time to plant is governed by latitude. In a good many sections early Spring is considered the better time. An objection to Fall planting is that the roots of a tree do not take hold of the ground sufficiently to supply enough moisture to maintain a healthy, active circulation of the sap which is required to prevent shriveling of the branches during the cold of the Winter and exhaustive evaporation from drying winds. The experience of others will be a guide to the orchardist in setting out his trees.

Selection of Trees.

The selection of trees is a very important part of orcharding, for upon care and judgment in the matter depend largely the future profits of the investment. Strong, stocky and vigorous one and two-year-old trees, called "whips" by nurserymen, having well developed root systems are preferable. Trees of this type and age are more satisfactory and profitable in time and suffer less in transplanting, cost less and are more easily handled than older ones. In this connection we would suggest the advisability of purchasing trees for planting from the nearest responsible nurseryman. The local nurseryman, if perfectly familiar with his business will understand the needs and demands of his customers and should grow the varieties best suited to his section of country. If honest he should feel himself morally, if not legally responsible for the correctness of his nomenclature. By securing trees at the nearby nursery all danger from damage by long transit and the injurious effects of sunshine and frost are avoided. Besides, if the farmer makes his purchase direct from the nurseryman, he will save the expense of the middleman or agent, and is less liable to the mistakes and injury that may accur through repeated handling.

Varieties.

Owing to the greatly diversified soil and climatic conditions that exist throughout the territory of the United States, it would not be safe to attempt to give more than general advice on the subject of varieties to plant. Among the very extended list of cultivated varieties of merit, there are few, if any, sections where the apple will grow for which varieties may not be found that will give satisfaction if they

have a fair trial. But it is a well known fact that but few of the many varieties can be safely recommended for a special locality. There are certain varieties that have a wider range of adaptability than others. Instances of this character may be found in the Ben Davis, which has a wide range of adaptability, while the success of the Yellow Newtown or Albemarle is confined to a few localities. Some of the Oregon districts which specialize are referred to under another heading. Again, a variety may succeed in widely separated regions, while in the intervening sections it may be an entire failure. This is well established in the case of the Yellow Newtown, which reaches its highest state of perfection in certain sections of the Pacific Northwest fruit regions and in the Piedmont sections of Virginia and North Carolina, while in most of the widely diversified intervening territory it is nearly worthless.

With these facts before the reader he will readily see how unwise it would be to attempt to offer in this connection other than general advice on the subject. A comparatively safe guide for the planter to follow or to be governed by is to study well his immediate environs and to take counsel of those of his neighbors who have had practical experience in growing varieties on soils or exposures quite similar to his own. In this way he may be able to obtain valuable information in regard to varieties that have been tested and found to succeed in his neighborhood.

Adaptability of Trees to Soil.

In the pioneer days of fruit culture, the great aim and object of the enterprising planter seems to have been to secure and plant all of the numerous varieties within his reach without considering the question of the adaptability of the variety to conditions of soil and climate. For a time at least, when the soil was new and diseases and insects were less numerous, his efforts gave fairly satisfactory results. Now, however, conditions have changed and many of the sorts that were once popular and profitable are considered valueless. So that, notwithstanding the fact that the list of desirable varieties is greatly increased, growers find themselves compelled to study more carefully the adaptability of the varieties suited to their special conditions and purposes.

It is for these reasons that the carefully prepared lists of fruits, as revised by the American Pomological Society and the Division of Pomology, and published by the United States Department of Agriculture (Bulletin No. 8, Division of Pomology; Revised Catalogue of Fruits) may be recommended to the planter as a comparatively safe guide in the selection of varieties. In that Bulletin the country is divided into districts to which certain varieties are found to be more or less specially adapted. While this may not be followed as an infallible guide, it is made up largely from the practical tests that have been given such varieties within the several sections and districts into which the country is divided.

In making up a list of varieties for a family orchard, it is highly important to select such as will ripen in succession, so as to furnish the family with fruit throughout the entire year. This can be readily done by planting the early ripening sorts, followed by late Summer, Fall and long keeping Winter varieties.

Apples Adapted to Oregon.

In the list prepared by the government is included varieties adapted to this State. In its preparation the conditions of soil, climate, latitude, elevation as well as the results already achieved were taken into consideration. From the list the planter may select such as are suitable for his own locality, bearing in mind the fact that there are others within his reach that may be profitably added to those here named. In the choice of varieties the planter should keep in mind the advice already given in this bulletin to be governed largely by the results and experiences of those who have preceded him in his immediate vicinity. Two or three trees of each of the earlier ripening varieties will afford sufficient fruit for any ordinary-sized family. Should the farmer desire he may plant in addition to his family orchard varieties suitable for commercial purposes, such are designated in the list by an asterisk; thus, *Spitzenburg.

Approved List of Trees.

The arrangement of the following list is approximately in the order of ripening. For Oregon the following varieties are suggested:

Tetofski.
*Yellow Transparent.
Early Harvest.
Red Astrachan.
Red June.
*Duchess of Oldenburg.
*Maiden Blush.
Gravenstein.
*Wealthy.
Wolf River.
Fall Pippin.
Fameuse.
*Golden Grimes.
*Jonathan.
Sweet Talman.
*Rome Beauty.
Red Canada.
Missouri Pippin.
Westfield.
Golden Russet.
*White Pearmain.
*Winesap.
Yellow Bellflower.
*White Pippin.
Hubbardston.
*Baldwin.
*Tompkins King.
Genet Ralls.
Wagener.
Russet Roxbury.
*Spitzenburg.
*Ingram.
*Yellow Newtown.
Delicious.

Planting.

The land having been prepared by plowing and manured where needed, the lines to guide the planter may be marked off with a plow run deeply, opening a furrow in the direction that will afford drainage, into which the trees may be set without digging holes, especially if in clay land, which would form basins that would retain water too long after a heavy rainfall. In other soils, there are different methods in use. As a rule, the man who plants trees has had previous experience. Failing this he secures the services of some experienced person. Lack of knowledge along this line invites failure. Improper handling and planting must be guarded against. A large orchardist gives it as

his opinion that in his section (North Carolina) fifty per cent of the trees sent out from nurseries never come to usefulness, and that this great loss is due to careless and unintelligent handling rather than to any other cause. The work of planting is made comparatively easy by the opening of a furrow with a plow for the rows and cross checking to indicate the points at which to set the trees. When planting, cut back the top to a point where the future head is to be formed, smooth off the ends of all the bruised and broken roots, then set in furrow or hole, straighten the roots out into a natural position, fill in among them firmly fine dirt and tamp all down with the foot or by some other means. It is best to set the trees a little deeper than when in the nursery, leaning them slightly in the direction of the prevailing winds. The tops of trees inclining to the south or southeast will soon shade and protect the bodies from the intense heat of the Summer sun which is likely to cause sun scald.

Losses by Lack of Care.

In connection with the death of trees it is desired to lay special stress upon the importance of performing all the operations in the management and care of an orchard in a painstaking way. It is worse than time and money squandered to purchase trees, transplant them, and then neglect them afterwards in such a manner as to lose them entirely; and yet this is the result in a great many cases. It must be borne in mind that this circular treats of orchards in general, and not the commercial orchard alone. It is believed the family orchard is equally important in its use. It is believed that every land owner should have fruit trees. They are necessary to the environment of a country home. It has been estimated that scarcely more than 10 per cent of the trees that are grown and sold by nurserymen survive the after-ordeal to which they are subjected before reaching the bearing age. And this great loss is very largely the result of the carelessness and neglect of the planters. The farmer who does not propose to give the same careful treatment to his orchard that he does to his other crops had better not make the effort to have one. If he expects to sow his orchard of young trees to grass or grain and then to graze it with calves or other live stock he will find other and cheaper methods of occupying his land and feeding his stock than by investing in trees. He had better save his money and pains and wisely decide in advance to go without an orchard.

Culture.

Thorough and oft repeated stirring of the soil is absolutely essential to success. Such culture as is needed to produce a first-class crop of corn or potatoes will keep an orchard in good health and vigor, provided the ground is sufficiently fertile. As already stated, in no case should small grain or grass be grown in an orchard. This mistake is often made by thoughtless or inexperienced planters.

The ground having been properly prepared before planting, a cultivator frequently run between the rows will keep it in good condition during the growing season. Each Spring the surface should be

well stirred with a two-horse plow, using a short singletree next to the rows of trees to avoid danger of bruising the trunks. Such culture should be continued from year to year at least until the trees come into full fruiting, and even then it is questionable whether it should be discontinued. If it should be discontinued red or crimson clover is the only crop which should be planted, and that should be turned under as often as once in every two years. As a rule, continuous cultivation gives the most satisfactory results.

Pruning and Training.

Pruning and training are requisites in the successful management of an apple orchard. The objects to be attained are: First, symmetrical and evenly balanced heads; second, to admit sunlight and free circulation of air into all parts of the tree top and yet maintain sufficient density of foilage to protect the trunks, branches and fruit from the direct, intense heat of the sun's rays, which is likely to scald and injure both tree and fruit. Training should begin in the nursery row by removing or preventing all unnecessary growth, which may be done by rubbing off the buds or pinching back the tender shoots with a view to making a straight, clean leader from the ground up, from which to form the future trunk.

Shaping the Tree.

As recommended under the head of planting, this single stem, if it has attained a sufficient growth, should be cut back at the age of one or two years to the height from the ground it is proposed to form the head of the tree when set in the orchard. This cutting back will cause several of the upper buds to break and grow, thus starting the top or head at the proper height; and these should be watched and only such left to grow as are to form the main branches. Those left should be the strongest shoots, at equal distances apart around the stem, and should tend to an outward growth—to spread and make an open head. In all pruning to give desired form to the head, and especially while the tree is young, the orchardist should keep clearly fixed in his mind the future form of the tree—that is, what it should be, when old; for what may seem an open head when young may prove, when the tree is older, to be too dense and crowded, the branches too closely formed together for convenience in getting around it in gathering the fruit or in giving it the necessary pruning.

During early Springtime, or even late Winter for convenience, when the wood it not frozen, each year every tree should be carefully looked over and all branches which are likely to interfere with adjoining ones should be cut out and the centers of the dense growth thinned out, side branches which are making a stronger growth than the others should be checked by heading in the terminal or central shoots and all parts of the tree should be cut back whenever needed to maintain an evenly balanced head. Some varieties have an upright habit of growth and some make slender growth. Such need close attention each year in cutting back one-half of the last year's wood growth,

leaving the top bud on the side of the branch facing the direction to which it is intended to divert the growth. By this treatment there will be no difficulty in shaping the tree into any desired form. Open spaces in the tree may be closed up; as, for instance, when the tree has been deprived of a necessary branch by accident or otherwise, the loss may be recovered in time by pruning the adjoining branches so as to divert the growth into the portion made bare of branches. All pruning and training possible should be done while the trees are young and the growth of wood tender, as the healing over is then more rapid and complete, and the tree suffers less injury by the operation.

If it becomes necessary to remove a large branch, the wound should be covered with grafting wax, paint, or some other substance that will prevent evaporation and keep the wood from checking and consequent decay.

Height of Top.

There is a diversity of opinion among orchardists as to the proper height at which to form the top or head of an apple tree. Formerly from four to five feet high was the common practice in training apple trees, but two to three feet is now generally preferred. The objection to low headed trees on account of the difficulty in cultivating the land has been overcome by practical experience. A careful teamster will do less damage to a low-headed tree than to one with a high top. With the improved implements now in use thorough tillage can be performed as well among low headed as with higher trees. There is less danger from high winds with the low heads, pruning can be performed with greater facility and ease, and the saving in the expense of gathering the fruit is quite an item; but the more important advantage gained by the low head is the protection of the body of the trees from the rays of the sun, causing what is known as sun scald, which is prevalent in some apple growing sections. Another point gained by the low head is in conservation of moisture and lower temperature around the base of the tree. No arbitrary rule however, should be laid down as to the height of a fruit tree. This may depend upon the locality, exposure, variety and desire of the planter. Some varieties have an upright habit of growth, while others have a drooping or horizontal habit, each requiring a training according to its requirements; but whatever difference of opinion there may be on the subject, it is now generally conceded that the low top, all things considered, is preferable.

Form of Top.

There are three forms of top that are generally adopted in the country. One, known as the vase or goblet form, prevails to a large extent in the Pacific Coast region, where by long experience it has been found to be best suited to the conditions of this section. This form is obtained by cutting out the central stock or leader and training by a system of pruning into the desired shape. The pyramidal form is the opposite of the vase form in that the main stock or leading shoot of the tree is allowed to maintain its upright growth and the side branches are shortened back so as to produce the desired form. There

is another and a modified form, between the vase and the pyramid, which gives a round, symmetrical shape to the tree, sufficiently open to allow of free circulation of air and sunlight.

Picking and Packing.

In handling the apple crop, we must commence with the picking. During the growing season the orchardists who grows fruit for commercial use will go over each tree carefully, and thin the growth. This requires the exercise of judgment and cannot be left to inexperienced persons. The trained eye is quick to discover a blemish and to discern where the fruit is too thick. Experience has made it possible to thin sufficiently by going over the tree but once. No set rule can be given for the picking of all varieties. There are some kinds that need special attention. The Jonathan probably suffers more than any other variety from unseasonable picking. There is a tendency to allow this apple to hang too long on the tree in order that it may develop a high color; as a result there is frequently a tendency to core-rot. This shows no trace at the time the fruit leaves the shipper. With all red apples it is suggested that the grower make several pickings of the fruit, rather than attempt to gather all the fruit with one picking. The yellow apples are picked at any time that the seed is colored. Generally, Newtowns have been preferred with considerable color, but the past season has shown that the greener the Newtowns were the better prices they brought. The methods employed in picking have a great deal to do with the keeping qualities of the apple. It should be picked so as to not pull out the stem in any way, for such exposed parts are the breeding places for germs and decay. The fruit should be laid carefully into baskets or pails. Picking bags have not proven entirely satisfactory.

The Time to Pick.

The best days for picking the fruit are the cool, dry days. Picking during excessive heat or exposing the fruit to heavy rains are not conducive to good handling. As soon as the fruit is gathered it should be taken to the packing or storing house. There are, of course, exceptions to this; if it becomes necessary to pick the fruit during extreme warm weather and it is not possible to carry the fruit rapidly under cover, where the temperature is right, it is suggested that it be left in the shade until it has cooled. If the hot fruit is placed in cold storage rooms it immediately sweats and thus interferes with the easy wiping and packing. Fruit should be wiped as soon as possible after gathering. If allowed to stand it may sweat and gum in such a way as to render proper wiping almost impossible. In wiping use a soft mit or cloth. The aim should be merely to remove the spray spots or dust and not to polish the fruit; polishing, unless properly done, might be injurious. As the fruit is wiped, it should be graded, both as to quality and size. Concerning size, the apples are generally graded according to tier, using a grading board which has holes for three, three and a half, four and four and a half tier. All the various packs are made up from the fruit that can pass through these four holes.

The fruit should also be graded by quality. There is no definite standard covering the districts of the State. The various sections have their own nomenclature such as fancy, choice, seconds, etc. It will probably be a matter of some difficulty to get up a system of grades that will be uniformly adaptable.

Rules for Packing.

At the last National Apple Show about 200 growers from the various parts of the Northwest met and adopted the following rules:

First. That our apples be packed in three grades.

Second. That said grades be named" extra fancy," "choice," and "orchard run."

Third. That where the words "extra fancy" are stamped on the box, it shall signify that the apples when packed were sound, uniformly graded as to size in each box, smooth, practically free from bruises, worms, worm stings or disease, and have reasonably proper shape for the variety and were fully matured. All red varieties in the grade shall be at least 50 per cent red, except Spitzenburg, Winesap, Jonathan and Arkansas Black, which shall be at least 70 per cent red. Yellow Newtowns, White Winter Pearmains, Grimes and Golden Bellflower, Ortleys, Winter Bananas and Red Cheeked Pippins will be allowed in this grade.

Fourth. The "choice" grade shall consist of apples sound, uniformly graded as to size in each box, free from any breaks in the skin, or black bruises; also free from worms, or any disease which materially injures the quality of the apples.

Fifth. Where for any reason the grower or packer does not desire to use the "extra fancy" or "choice" grades, we recommend the varieties be packed in one grade, termed "orchard run." The apples in this grade shall be practically free from worms or any disease which materially injures the quality of the apple, and shall not be smaller than five tier nor less than two inches in diameter.

Proper Packing.

Correct packing is learned only by careful study, and is, as a rule, done under the supervision of men designated by the Fruit Growers' Associations in the different districts. Good fruit, of uniform size, and "honest pack" has had much to do with the success that has come to Oregon as an apple producing section. The commission men in the eastern, or in any other market who are assured that when placing an order for a carload of fruit they will get exactly what they want, will continue to do business with the association or the individual who treats them right. In most of the apple growing districts in Oregon the fruit is taken from the orchard to the packing house, where it passes into the control of an association which assumes responsibility for its proper handling, its sale and delivery. The results have been beneficial to all concerned. At home and abroad Oregon apples have a reputation for excellence which is unsurpassed. The Oregon brand is a synonym for apples which are perfect in every way. The style

of packing varies somewhat. A standard size box approved by fruit growers is now prescribed by legislative enactment. This is placed at 18 inches long, 11½ inches wide and 10½ inches deep. Provision is also made for a special size of box, the dimensions of this being 20 inches long, 11 inches wide and 10 inches deep.

Number of Apples to Box.

When a standard box is used, 96 and 112 are packed four-tier and 200 will pack five-tier. Spitzenburgs and Ben Davis, 128 size long may be packed 125 to the box. Flat apples, like the Wagener, may be packed four-tier by placing all on their side. Ninety-six, 104, 112 and 120 may be classed as four-tier apples, and 185 and 200 as five-tier.

Apple culture is an art. Correct packing is a science. Perfect fruit is the result of constant care. The placing on the market in good condition and attractive form results in giving the grower commensurate return for his intelligent labors. In most of the apple growing districts there are associations the members of which not only put forth every effort to get the best possible results from the bearing orchard, but are keenly alert to the necessity of getting the newcomer started right. The man who plants an orchard this year is given the benefit of the experience of all who have preceded him. Meetings are held at which everything necessary to the production of perfect fruit is discussed. In the kindergarten, the beginner will be taught how to prepare the ground and in other grades he is taught correct methods of planting, pruning, spraying, picking and packing. Perfection is sought and nothing short of this will satisfy the men who are engaged in growing apples in Oregon.

Spraying.

Insect control in orchards is largely effected by spraying, and the needs of the fruit grower in the protection of his crops from the ravages of insects and fungi have been the predominating influences in the development and excellence of present day spraying apparatus. Nowhere in the world are insectidal operations more extensively practiced than in the United States. The money which is spent in this country each year for labor, apparatus, chemicals, etc., in insect warfare is a very large sum, amounting in the case of the codling moth to not less than $5,000,000 and an equally large sum is spent in treatments against the San Jose scale. Although spraying is without doubt the most expensive of the several orchard operations, the value of the crop is so greatly enhanced thereby that it is a comparatively small investment, the expense amounting to but a fraction of the returns directly due to the practice. Orchard spraying is, in fact, an exceedingly cheap form of insurance.

Thorough Methods Needed.

It must not be inferred, however, that spraying operations are uniformly successful; in fact, this is far from being the case. Of all

orchard work, spraying is most likely to be slighted or even neglected. Numerous fruit growers have not even adopted the practice, and others are not sufficiently familiar with the details of the work to secure reasonably satisfactory results. Inadequate knowledge of the essential features of spraying has been a serious drawback to the extension of its use. Many orchardists have no standard or conception of what constitutes thorough work, and are practically without knowledge of their insect foes. Under such conditions results in most cases are unsatisfactory and in the estimation of some this has given rise to the opinion that spraying is without merit.

Spraying.

The term "spraying" unfortunately has become to have rather a general meaning and it is apparent that many fruit growers and others do not understand that the kind of spray and the manner of application depend upon the character of insects to be controlled. While it is entirely practiable to indicate a system of orchard spraying to control the important insects and fungous diseases such a system must take account of the peculiarities of the troubles in question. A better understanding by orchardists of the whys and wherefores of spraying would result in a marked improvement in the vigor of orchards and the quality of fruit and an important saving in expense for labor and materials.

How Insects Feed.

A knowledge of the character of the mouth parts of insects is of importance to the fruit grower as determining the general character of sprays to be used. Broadly speaking, all insects secure their food in one of two ways—(1) by actually biting but not swallowing portions of the food material, or (2) by sucking out the juices from the interior portions of the host. While there are exceptions to this general statement, these are unimportant in the present connection. The biting and the sucking types of mouth parts are on two quite distinct plans. In the former there are two horny, opposable jaws, working sideways, and certain accessory appendages, with which particles of the leaf, bud, fruit, or other food substances are cut out and passed on as more or less solid particles to the food canal for digestion. This type is found in several orders of insects, as in caterpillars or the larvae of moths and butterflies; the grubs and adults of Coleoptera or beetles; grass hoppers, crickets and other Orthoptera; and sawflies, bees, etc., of the order Hymenaptera. All biting insects are subject to destruction with stomach poisons, as arsenicals. Some insects do not feed in situations where poisons may be applied, those for instance, which feed on the interior portions of plants (apple tree borers, etc.), and on the roots.

In insects having sucking mouth parts, the mandibles and maxillae are drawn out into long setae, or bristles, which are inclosed in the greatly modified tubelike lower lip, or beak, the four setae and beak constituting a sucking apparatus with which juices may be drawn up

from plants. In feeding, the beak is placed upon the plant surface or slightly inserted. The threadlike bristles are pushed down into the plant, and by a pumping action of the fore part of the food canal the sap is readily extracted. Plant lice, scale insects, leaf hoppers, the pear psylla, and the true bugs, very important enemies of the horticulturist, are sucking insects and for their control contact sprays are used, such as corrode the body or penetrate the breathing pores (lime, sulphur wash, whale-oil, soaps, kerosene emulsion, etc.)

Biting and sucking insects often occur in a way to permit of their practical destruction by poisoning the air which they breathe, as with hydrocyanic-acid gas or carbon bisulphate. The fumigation of trees with hydrocyanic gas, or "gasing," is extensively practiced in California in the destruction of scale insects infesting citrus trees and also in Florida against the white fly. Its value for similar purposes against certain deciduous fruit insects, especially the San Jose scale, was fully tested under eastern conditions, and while practicable for smaller trees it has never been adopted to any extent for the reason that the expense of the operation in proportion to the value of the crop produced is relatively high. Deciduous and other nursery stock is under a rule of the Oregon State Board of Horticulture regularly inspected by nurserymen of the State to guard against the possible dissemination of injurious insects. Carbon bisulphide is useful against underground species, such as the woolly aphis, etc.

Spraying Dormant Trees.

The spraying of trees during Winter and Spring, or when they are in a dormant condition, is directed largely against scale insects, especially the San Jose or Chinese scale. These are two principal advantages in spraying at this time: (1) the absence of foliage permits of more thorough applications and (2) the sprays may be used much stronger than during the growing season. Contact sprays are employed, as whale-oil and other soaps, kerosene and crude petroleum emulsions, miscible oils, lime, sulphur wash, etc. The prime essential is thoroughness in making applications, covering every part of the tree from top to bottom, as in general only those insects coming into actual contact with the spray are killed.

Applications may be made in late Fall, as soon as most of the leaves have fallen, at favorable times during the Winter when the temperature is above the freezing point, or, preferably, in the Spring shortly before the buds are due to swell. Spraying in late Fall and early Winter is thought by some to be more effective than later, on the supposition that the scale insects are not yet entirely dormant; and the prevailing fair weather at this season and the usual slackness of work are additional reasons for Fall spraying. However, the danger of injury to fruit buds and twigs, especially from the use of mineral oils and whale-oil soap is unquestionably greater. On the whole, Fall spraying has not yet come into extreme practice; although at times attended with unfavorable weather conditions, the work is mostly done in the Spring. In Oregon districts spraying may be done at times when it is impossible to do it elsewhere. In the case of lime-sul-

phur wash, notably better results follow spraying late in the Spring to insure as large an amount of spray on the trees as possible during early Summer, and thus destroy any young scales from adults which may have created destruction. In fact, this continued action of the wash is perhaps quite as important as its first effect.

Spraying dormant trees for the San Jose and other scales and for other insect pests has come to be a very important part of orchard work in the northwest and on the Pacific Coast, and it frequently is possible so to time this work that a single application will at times reach most of the troubles. Other things being equal, the insecticide having the greatest range of usefulness should be employed. Of the several dormant tree sprays the standard lime-sulphur wash is the one most generally used, and is equally effective among many other insects which may coexist on the trees. It is an excellent fungicide, and, aside from the inconvenience experienced in its preparation and its disagreeable character, it furnishes an ideal dormant tree spray. In practice, therefore, the plan should be to make one thorough application of lime-sulphur wash to orchards each Spring as a general treatment for the control not only of the San Jose but of many other scale insects, and other pests.

Summer Spraying.

By Summer spraying is meant application during the period of foliage. The work is directed principally against bud, leaf and fruit-eating insects, and an arsenical is chiefly used. Contact insecticides, exclusively used in dormant tree-spraying are also employed in a dilute condition in the control of certain insects, as aphides, leaf hoppers, etc., but for the larger part of Summer spraying consists in the application of arsenicals, either in water or in Bordeaux mixture, effecting in the latter case combination treatments for fungous and insect troubles.

Two arsenicals are chiefly used, namely Paris green and arsenate of lard, though numerous others are available, as arsenite of lime, Scheele's green, etc. The aim is to use these about as strong as the foliage will stand without injury, though well made arsenate of lead, a comparatively recent addition to arsenical insecticides may be used in unmeasurably large quantities without injury to most plants. The foliage of some fruits, as apple, pear, quince and grape, is but rarely injured by effective strength of Paris green and is perhaps never by well made arsenate of lead. But the foliage of stone fruits, as cherry, plum and peach is on the whole quite tender and arsenicals must be employed with caution. Arsenate of lead is least likely to do harm, though repeated applications of this poison may cause shot-holing and dropping of leaves and burning of fruit.

Summer spraying is perhaps more practiced in the case of the apple than in that of any other fruit. The principal pests to be controlled are the codling moth, the plum and apple curculios and the lesser apple worm which affect the fruit; and the bud moth, canker worms and tent caterpillars, which eat the foliage. While these several pests exhibit individual peculiarities in feeding, a system of spraying

which is recommended by the Department of Agriculture as effective in controlling or greatly reducing is given as follows:

Scheme for Spraying Apple Orchards.

First Treatment—In orchards infested with the bud moth, spray with arsenate of lead or Paris green just as buds are swelling.

Second Treatment—Spray arsenate of lead or Paris green in Bordeaux mixture when cluster buds are out, but before the blossoms open. This treatment is valuable against the bud moth, canker worm, plum and apple curculios, tent caterpiller, etc.

Third Treatment—As soon as the petals have fallen, spray very thoroughly with arsenate of lead or Paris green in Bordeaux mixture so as to place a dose of poison in the calyx cup of each young apple. Larvae of the codling moth, the principal cause of wormy apples, hatching some three or four weeks later, mostly enter the fruit at the blossom end, and are thus killed. This is the most important of all treatments for the codling moth and is valuable in destroying the lesser apple worm, plum and apple curculios, canker-worm, tent caterpillar, etc.

Fourth Treatment—Three or four weeks after blossoms have fallen, use an arsenical in Bordeaux mixture, thoroughly coating the foliage and young fruit. This is valuable against the codling moth and affords further protection against the insects above mentioned.

Fifth Treatment—An additional application of an arsenical in Bordeaux mixture is necessary, nine or ten weeks after the blossoms fall, for the second brood of the codling moth. In orchards not infested with the bud moth and canker-worms, the first and second treatments may be omitted.

The apple grower in Oregon may command the services of the member of the State Board of Horticulture for the district in which he resides, and the services of the entire board are at the disposal of the people of the State. Copies of the Horticultural Laws in full are published in the reports of the board, which are made bi-annually. In addition to this the reports of the experiment stations in the State, and of the Department of Agriculture on all subjects pertaining to horticulture are sent free to any address. Formulas for the different sprays are procurable and the mixtures are also on sale. There is a community of interest in each fruit growing district, and helpful advice is always to be had from the orchardists and the associations. High grade fruit is grown in Oregon. The State Board of Horticulture, the communities and the individual orchardist are a unit for the production of perfect apples, and their efforts are along intelligent lines and are meeting with deserved success.

Irrigation.

While moisture is essential to tree growth, irrigation is unnecessary in many of the fruit districts in Oregon. In the Rogue River and Hood River Valleys there is an abundance of water if it were desirable to convey it to the trees. Less then five per cent of the

orchards in Rogue River Valley are irrigated and very few of the Hood River orchardists irrigate. At Mosier there is no irrigation system and The Dalles is a "dry-farming" community. In some sections the orchards are irrigated. Trees on the reclaimed arid lands must have moisture applied in a scientific manner. In other sections there are orchards which without the aid of applied moisture produce fruit of little commercial value. This subject is too large to enter into in detail here. Conditions of soil and climate vary to such an extent that no set rules can be formed to guide the fruit grower. It is a good rule not to irrigate until it is known that cultivation has failed to furnish the needed moisture. Experienced growers soon learn to recognize the signs of distress in a tree suffering for lack of moisture. A supply of water is invaluable in many localities during the first season after planting an orchard. Trees set in the early Spring make a fine growth for a few months but as the season advances the leaves will wither and fall off. The roots cannot penetrate during the first season to a depth that will insure the life of the tree. There are many arguments for and against irrigation. Possibly some of the evils attributed to it are due to lack of intelligent application of water. It is conceded that the best quality of apples can be secured only by adequate moisture. It matters not in what manner it reaches the roots of the tree. The man who plants an orchard must be governed by conditions existing in the section where he sets out his trees.

Synopsis of Horticultural Laws.

Oregon has a State Board of Horticulture, the members of which were selected with reference to their knowledge of and practical experience in horticulture and the industries connected therewith. Meetings are held as often as deemed expedient for consultation and for the adoption of measures which will best promote the horticultural industries of the State. The act creating the board and defining its duties went into effect in 1895. Section 6 of the enactment provides that for the purpose of preventing the introduction into the State or spread of contagious diseases, insects, pests, or fungous growths among fruit or fruit trees, and for the disinfection of grafts, scions, orchard debris, fruit boxes and packages and other material or transportable articles dangerous to orchards, fruit or fruit trees, the board may make and promulgate regulations for quarantining, inspection and disinfecting thereof. Such regulations, when promulgated (by printed notice sent fruit growers and by publication in newspapers throughout the State) shall be held to import notice to all persons within the State and shall be binding upon all persons therein. Willful violation of any quarantine or other regulation of the board is deemed a misdemeanor and is punishable by fine or imprisonment, or both.

Members of the board are required to visit the different districts into which the State is divided to see that all regulations of the board and all provisions of law to prevent the introduction or spread of fruit pests and diseases of trees or plants injurious to the horticultural interests of the State are enforced. If, in the opinion of the board, any locality, district, orchard or place is infested with fruit pests, or in-

fected with contagious diseases injurious to trees, plants of fruits, and liable to spread to other orchards or localities to their damage or injury, the board shall declare such place to be under quarantine, and subject to such regulations as may be prescribed. Failure of owner or agent to observe the regulations is punishable by fine, imprisonment, or both. The quarantine shall not be removed until all danger shall have passed.

It also made the duty of the members of the board, when deemed necessary, to cause an inspection to be made of any orchard, nursery, trees, plants, vegetables, vines, fruit packing house, store room, sales room or any other place within their districts, and if found infested with disease or growth liable to spread to other places or localities, or such nature as to be a public danger notice shall be served upon the owner or person in charge requiring them to eradicate said pests or insects, or to treat such contagious disease within a specified time. Said notice shall contain directions for the application of some form of treatment for the eradication or destruction of pests or for the treatment of contagious diseases or fungous growth. All places, trees or infected fruits are declared a public nuisance and if not abated within a specified time, by the person in charge, it becomes the duty of the board to at once abate such nuisance and any expense incident thereto shall be chargeable thereto and collectible from the owner of the trees, fruit or premises. Summary proceedings may be resorted to by the board.

An act amendatory to the foregoing makes it the duty of the president of the State Board of Horticulture to visit at least once a year every district in the State and examine the orchards, nurseries and work of the district commissioners and ascertain whether or not the law and regulations of the board are being properly executed. He is also required to visit the principal fruit shipping points during the shipping season, inspect the fruit shipped and prevent the shipping of insect and pest-infected fruit. He is further required to visit each county to receive complaints of fruit growers and to distribute to them printed and oral instructions regarding destruction of pests and other information including proper methods of handling, packing and shipping fruits.

An enactment for the protection of the fruit industry in Oregon contains the following provisions:

It shall be the duty of any person, firm or corporation owning or operating any nursery or fruit orchard, and knowing any such to be infected with any kind of insects, pests or disease, to immediately spray or destroy the same in such maner as the fruit commissioner for his district may direct.

It is unlawful for any person, firm or corporation to import or sell any infected or diseased fruit of any kind in the State of Oregon.

Every person who packs or prepares for shipment to any point, without the State, or who delivers or causes to be delivered to any express agent, or railroad agent, or other person, or to any transportation company or corporation for shipment to any point without the State any fruit or fruits, either fresh, cured or dried, that is infected

with insects, pests or diseases, injurious to trees, shrubs, plants, fruits or vegetables, is guilty of a misdemeanor.

Violation of the provisions of this act are made punishable by a fine.

False Branding Unlawful.

An act approved February 7, 1907, provides: Any person, firm, association or corporation engaged in growing, selling or packing green fruits of any kind within the State of Oregon, shall be required upon packing such fruit for market, whether intended for sale within or without the State of Oregon, to stamp, mark or label plainly on the outside of every box or package of green fruit, so packed, the name and postoffice address of the person, firm, association or corporation packing the same; provided further, that when the grower of such fruit be other than the packer of the same the name and postoffice address of such grower shall also prominently appear upon such box or package as the grower of such fruit.

It shall be unlawful for any dealer, commission merchant, shipper or vender, by means of any false representation whatever, either verbal printed or written, to represent or pretend that any fruits (mentioned in the act)were raised, produced or packed by any person or corporation, or in any locality other than by the person or corporation or in the locality where the same were in fact raised, produced or packed as the case may be.

If any dealer, commission merchant, shipper, vender or other person shall have in his possession any of such fruits so falsely marked or labeled contrary to the provisions of this act, their possession by such dealer of such fruits so falsely marked or labeled shall be prima facie evidence that such dealer, commission merchant, shipper, vender or other person has so falsely marked or labeled such fruits.

Violation of the provisions of this act shall be deemed a misdemeanor, and any person convicted of a violation shall be punished by a fine of from $5 to $500 or by imprisonment, or by both.

Trees Must Be True to Name.

Any person selling nursery stock or young trees and representing the same to be of a variety different from what said nursery stock or trees actually are, shall be required to replace all such trees with stock of the same grade and variety as the original order and shall be required to make reasonable compensation to the purchaser for expenses and loss of time due to such error having been made.

Quarantine Regulations.

The following regulations, in accordance with the laws regulating such matters, have been adopted by the Oregon State Board of Horticulture, and are therefore, binding upon all persons:

All consignees, agents or other persons shall, within twenty-four hours, notify the quarantine officer of the State Board of Horticulture, or a duly commissioned quarantine guardian, of the arrival of any

trees, plants, buds or scions at the quarantine station in the district of final destination.

All trees, plants, cuttings, grafts, buds, or scions imported or brought into the State from any foreign country or from any of the states or territories, are hereby required to be inspected upon arrival at the quarantine station in the district of final destination; and if such nursery stock, trees, plants, cuttings, grafts, buds, or scions are found to be free of insect pests and fungous diseases, the said quarantine officer or duly commissioned quarantine guardian shall issue a certificate to that effect; and, futhermore, if any of said trees, plants, cuttings, grafts, buds, or scions are found infected with insect pests, fungi, blight, or other diseases injurious to fruit or to fruit trees, or other trees or plants, they shall be disinfected and remain in quarantine until the quarantine officer of the State Board of Horticulture or the duly commissioned quarantine guardian can determine whether the said trees, plants, cuttings, grafts, buds, or scions are free from live, injurious insect pests or their eggs, larvae or pupae or fungous diseases before they can be offered for sale, gift, distribution, or transportation. All persons or companies are hereby prohibited from carrying any trees, plants, cuttings, grafts, buds, or scions from without the State to any point within the State beyond the nearest point on its line or course to the quarantine station in the district of ultimate destination; or from any point within the State to any point therein, until such trees, plants, cuttings, grafts, buds, or scions have been duly inspected, and, if required, disinfected as hereinbefore provided; and all such shipments must be accompanied by the proper certificate of the inspecting officer; provided, however, that after such persons or company have given the proper officer four days' notice, he or they shall not be required to hold such shipments further, without the direction from such officer.

Rule 3.—All peach, nectarine, apricot, plum, or almond trees, and all other trees budded or grafted upon peach stocks or roots, all peach or other pits, and all peach, nectarine, apricot, plum, or almond cuttings, buds, or scions, raised or grown in a district where the "peach yellows'" or the "peach rosette" are known to exist, are hereby prohibited from being imported into or planted or offered for sale, gift, or distribution within the State of Oregon.

All persons growing nursery stock, trees, and plants for sale, or to be offered for sale, are hereby required to report to the commissioner of the district in which said nursery stock, trees, or plants are grown, for inspection during the months of September, October, or November of each and every year, and the commissioner of such district, or his duly appointed deputy, shall inspect such nursery stock, trees, or plants prior to shipment and delivery. When said nursery stock, trees or plants are found by said inspecting officer to be worthy of a certificate setting forth the freedom of such nursery stock, trees, or plants, from live, injurious insect pests, their eggs, larvae, pupae, or fungous disease the said inspecting officer shall then issue to the owner or owners of said nursery stock, trees, or plants, a certificate of inspection. The condition under which this certificate is granted is, that the party or parties receiving such certificate shall be compelled to disinfect by fumigation with hydrocyanic acid gas, as prescribed by rule of the Board, all pear and apple trees, or other stock grown on apple roots, after lifting the same and before delivery to purchaser or carriers; and, in case such fumigation is neglected, said certificate of inspection shall be void and of no effect.

Other Fruits and Nuts

The apple, not undeservedly the most popular of all fruits, has carried the name of Oregon around the world. And yet, if there were absolutely no apples shipped out of the State, the fame of Oregon as a fruit raising section would be secure, for Oregon produces every other variety of deciduous fruit to a degree of excellence fully equal to that attained by the Oregon apple. The general conditions that have combined to make the Oregon apple peerless among its kind are equally as favorable to the pear, the cherry, the prune, peach, etc., and to the grape and berry as well. Yet each fruit is peculiar to itself, each one has its own problems, and so each one has a different history. There was no royal road to success in the development of any of these fruits into commercial orchards. There were unexpected obstacles, disappointments and even failures. That was to be expected. But there were, as well, encouragements, successes, triumphs. The natural conditions—soil, climate, etc., were exceptionally favorable. All that was required was to develop methods of culture, handling and marketing to make the most of these conditions. With nature as a staunch ally, it needed only study, industry and intelligent co-operation to achieve an ultimate success. That success is now a matter of history.

The early pioneers of the 'forties and 'fifties brought with them a miscellaneous assortment of fruit seeds which they planted in the soil of their new homes. In the course of time, the seeds sprouted and grew, put forth branch and leaf and bud, and finally produced fruit after their kind, but larger, jucier, more highly colored and more abundant than had the parent trees from which the seeds were taken. These constituted the family orchards of the first settlers, and there still remain a few giant, hoary trees as monuments of those early days.

But the real development of the fruit industry is the story of a later day and a newer era. There is this connection. Orchardists coming to the Northwest found in the excellence of the fruit of these old trees a promise of the possibilities of horticulture in this section. If a few old, neglected trees could produce fruit of such superior quality, it was certainly reasonable to suppose that an orchard of selected varieties, scientifically grown and cared for, would produce fruit that would command a market. Acting on this presumption, the experiment was tried, and the results more than justified the logic of their inductions.

The Pear.

Eighteen years ago, Mr. J. H. Stewart shipped the first carload of pears from Oregon. His orchard was in the Rogue River Valley, and that part of the State has ever since retained the leadership in the production of that particular fruit. Mr. Stewart, with some associates, planted an orchard of 150 acres of apples, pears and peaches that was a success from the start. Other early pear orchards were set out in Douglas county, Marion county and other parts of the State, until now the pear is found in all of the leading fruit districts.

For the pear, a heavy soil is considered most suitable—heavier than for the apple. As for all fruit, high ground is preferred, where satisfactory drainage minimizes the danger from frost. Stagnant water and stagnant air are naturally receptive of frost. Rather less moisture is required for the pear than for the apple, as the root system has a tendency to strike more deeply in search of water. For this reason, the pear has never been given great attention in districts in which irrigation is largely depended upon. With any excess of moisture, the tree becomes more subject to its greatest enemy, the blight. If water is supplied with sufficient caution, however, there is no more danger in an irrigated section than in any other.

Deep plowing and thorough fitting of the ground is necessary. The stock used is all grafted to seedlings in local nurseries. Trees are set closer than with apples, about 60 to the acre.

The preferred varieties are the Bartlett, Anjou, Comice, Bosc, Winter Nelis, Clairgeau.

The Bartlett is probably the most popular variety both for eating out of hand and canning. Rated 6-8.

The Anjou is a fairly late Fall pear, large, symmetrical, highly attractive and highest quality. Rated 8-9.

The Comice is very similar to the Anjou, but larger, and has brought the highest prices in market. Rated 8-9.

The Bosc is a Fall pear of high quality, and a rich, distinctive flavor. Rated 8-9.

The Winter Nelis is small, a later keeper, and by many considered to have the highest quality. Rated 8-9.

The Clairgeau is very large but coarse. Rated 4-5. Clairgeaus, by the way, constituted the first solid car of pears to be shipped from the Northwest to New York, where they sold for $2.75 a box, at that time a phenomenal price.

Explanatory of the above ratings made by the American Pomological Society, it may be said that 10 is a perfect rating, being granted only to the "Seckel." These ratings are made for pears grown in other sections of the United States, and are hardly applicable to Oregon varieties.

Trees begin to bear at 3 or 4 years, but do not yield a commercial crop until the seventh year, and reach full bearing at twelve years. They are headed very low, and pruned back very rigorously.

The fatal enemy of the pear is the dreaded "blight," which has ravaged the orchards in so many sections of America and left destruction in its path. In Oregon, by strenuous, co-operative effort, the disease has been effectually checked. The bacteria of the "blight" attacks the tree in the Spring at the blossom and the tip end of the young shoots, and eat their way into the fibre of the tree until midsummer, when their pernicious activity is suspended until another year. The only effectual remedy is surgical treatment, administered promptly and efficiently. The infected portion of the tree is cut away and destroyed. So infectious is the disease, that the knife used is kept aseptic by dipping in a solution of corrosive sublimate after each operation. In the pear districts, experienced inspectors are appointed, whose duty it is to examine the trees and warn the owners of the first

symptoms of the malignant blight. Only by such methods can the trees be saved.

Other pests, the codling moth, lice and pear slug, are controlled by spraying. For the slug, arsenate of lead is used when the slug appears. Aside from the blight, pears are less subject to pests than the apple.

Pear trees have a marked tendency to over-production. So in order to save the trees from breaking under the load, and to insure the highest quality of marketable pears, the fruit is thoroughly thinned. As a rule, this is done when the pears are the size of marbles. Bartletts, however, are thinned when they are about two-thirds their full size, and the fruit thus removed is marketed. Pears are picked at the earliest possible date—as soon as the stem will separate readily from the branch. All picking is done by hand, the greatest care being necessary to avoid bruising. The fruit is wrapped and packed in boxes, cooled and shipped in refrigerator cars.

There is the widest variety in the prices for land suitable for pears. In the fruit districts $200 an acre is about the least for which land can be bought. In other sections land may be found for as low as $60 per acre. The higher price is fully justified, however, because success in horticulture depends so largely upon co-operation. The owner of a detached orchard labors under decided disadvantages, and there is so much at stake in the development of a commercial orchard that there is small economy in trying to find cheap land for this purpose. The cost of setting out an orchard, including stock, will not exceed $20 an acre. Cultivation and spraying during immaturity of trees will be covered by $7.50 an acre. When the trees are in bearing, cost of production is estimated at from 45 to 50 cents a box. The yield of a commercial pear orchard will average 450 boxes an acre per annum. Yields of 1000 and 1200 boxes to any acre are on record. From such orchards the profits are enormous. $350 an acre is a very low average, $1500 an acre is not extreme. and authentic cases of higher profits are known. Full bearing commercial pear orchards have sold for $3000 an acre and will return a large percentage on the investment. There is no reason to apprehend any over production, as the acreage is comparativey small, and the plantings in recent years have not been large. Moreover, the advantages for pear culture in certain limited sections of the State are such as practically to defy competition. The work is not arduous, but appeals to a man's intelligence and interest. There are few, if any, lines of effort that extend greater possibilities.

Prunes.

The humble prune, once despised by epicures and a staple for cheap boarding houses, is now being recognized as a nutrient at once most wholesome and delicious. With improved methods of production and evaporation, the prune is easily the best of all dried fruits, and is given a welcome place in the dietary of the most fastidious.

The first prune orchards were planted in Oregon in 1858, and were of the Italian variety. They were sold fresh in the local markets, and enormous profits were taken. The result was a prune boom of large di-

mensions. Hundreds of acres of prunes, mostly of the French variety, were planted by men who knew nothing of the industry, and the consequences were disastrous. As always, out of adversity came knowledge; out of failure, sucess. Growers with perseverance came to understand the nature of the tree and the fruit, the conditions necessary for its successful culture and the best methods of handling the product. The French prune was very largely abandoned in favor of the Italian, known also as the Oregon or Fallenburg, and this variety constitutes over 90 per centum of the prune orchards today. By far the largest acreage is in Western Oregon, especially in the Willamette and Umpqua Valleys, and all but a very small fraction of the product is dried. In the upper Columbia Valley there is a considerable acreage of Italian and Hungarian varieties, from which the fruit is marketed "green" or "fresh".

Prunes require a location in which blossoming is rather late. An elevation above 500 feet is desirable. Good soil of sufficient depth is necessary, and the red hill soils have been shown to be especially suitable. Under these conditions a good crop is sure, with but little variation from year to year. The stock is budded or grafted on the peach seedlings, as a rule, and the trees are set about 80 to the acre. They bear commercially at from the fifth to the seventh year. But little attention is required, one winter spraying of lime-sulphate being sufficient.

About the middle of September the fruit is gathered. This is done by shaking the trees and placing the fallen fruit in 60-lb. boxes. Pickers are paid from 6 to 8 cents a box for the work.

Preliminary to drying, the prunes are dipped into boiling lye and rinsed in clear water. This is done in order to make the skin tender. The fruit is then graded—by hand or by machinery—into three sizes and spread on trays. These are subjected to hot air at a temperature of 185 degrees Fahrenheit and are thoroughly "dried" or evaporated. Two methods are followed. In one the trays are piled in a high tower or vertical shaft. The heat is applied at the bottom and as rapidly as the lowest rack is dried, it is removed, the stack lowered and another placed at the top. In another method, a tunnel is used. The heat is applied at the end and the racks are removed and moved up as the process is completed. The Italian prune dries to from 28 to 32 per cent of its original weight.

The product is sacked and sold to packers according to the number of prunes required to make a pound. They are termed "30-40s," "40-50s," "50-60s," etc.

Salem is the principal packing center, with Portland next. Before packing, the dried prunes are thoroughly sterilized by steam, thus preventing any germ action, packed in airtight boxes and marketed.

Prune orchards yield fom 5 to 7 tons of green fruit to the acre. The producer receives from 3¼ to 5½ cents per lb. of dried prunes. The cost of caring for an orchard is about $10 an acre, and the expense of picking and drying from 2 to 2½ cents per lb. of dried prunes. Profits run from $75 to $250 an acre and are dependable.

While a prune orchard is not expected to return the enormous profits of pears or apples under most favorable conditions, it is far

less care, and far more certain. Consumption will show a steady increase and over-production is not to be thought of.

In 1910, 28,000,000 lbs. of dried prunes were sold from Oregon orchards, at a value of $1,680,000. Of fresh prunes and plums there were sold 300,000 crates, valued at $195,000.

Cherries.

It is not the policy of the organization under whose auspices this publication is made to use the superlative in connection with any of the products of this State. In the case of the cherry, however, it seems unavoidable. Eminent and impartial horticulturists have testified to the superiority of the Oregon cherry. The sour, Kentish, or "pie" cherry is not raised here to any extent, but the "sweet" or "heart" cherry attains an unexecelled size and quality. It is a fact that of the four varieties produced on the Pacific Coast—from which come practically all of the commercial sweet cherries—three originated in Oregon, and the fourth, though of foreign birth, was named and developed here. In his historical "travelling nursery"' Henderson Luelling brought a young cherry tree, the name of which he had forgotten. He remembered, however, that it was French, and so nominated it the Royal Ann. Afterwards it was recognized as the Napoleon Bigarreau. But the new name survived the old and is in general use today.

The Royal Ann is a light red cherry, large and delicious. The Black Republican, or Luelling, the Bing and the Lambert, are all dark red cherries. The Lambert is the largest and bears late in the Autumn. Both the Bing and the Lambert are very popular in Eastern markets.

The cherry requires about the same conditions as the prune. Soil and air drainage are especially necessary. Budded or grafted stock is used and the trees set 40 to 60 to the acre. The cherry tree grows very large and requires but little pruning. One spray a year is considered sufficient to keep the tree healthy. The only serious disease to which the tree is subject is "gummosis," which does not injure the fruit, but impairs the vitality of the tree. Spraying is of some benefit, but the malady is more effectively controlled by regulating the nourishment of the tree by judicious cultivation. The trees begin to bear at six years. The fruit is picked by hand and carefully packed in boxes holding 9 lbs. The fruit should be pre-cooled before shipping in refrigerator cars. Under refrigeration the fruit keeps from two to three weeks and will last for several days afterward without deterioration.

Co-operative methods in handling the cherry are even more essential than for the apple. At its best, the fruit is perishable and success depends largely upon the reduction of the time elapsing between the picking and marketing to the lowest possible degree. It is requisite that a sufficient number of cherries be picked at one time to make an immediate carload shipment. Pre-cooling plants are also of great advantage.

Other methods of marketing the cherry have been developed to some extent. There is a considerable demand for Royal Anns by the

manufactureres of Maraschino cherries. Dried in the sun or in evaporators, they make an excellent dried fruit, something like the raisin, but larger and sweeter. They are also packed in syrup and shipped East to pie makers.

Although there remains much to be done in the development of methods for marketing, there is no question as to the profitableness of the cherry orchard in Oregon. Cost of installing and caring for a cherry orchard will not differ materially from that for a prune orchards. Profits of $300 to $400 an acre may be counted on with reasonable certainty.

Peaches.

Peaches are successfully grown in all parts of Oregon, but the best results are obtained where the soil is light and the season especially early. These conditions are satisfied in most parts of Western Oregon, and especially in the Upper Columbia River basin and Southern Oregon, which are noted for the earliness and excellence of their peaches.

The culture of the peach in Oregon does not differ materially from that in the Middle West and the East. A longer growing season, less danger from frost and abundant moisture are, of course, of undoubted advantage.

Preferred varieties are the Early Crawford, Muir, Salway and Alberta. The fruit is large and fine, and, from most districts, with good keeping and shipping qualities. One-year-old trees are used and set from 80 to 108 to the acre. The ground is carefully cultivated, the trees headed low and thoroughly pruned. Trees begin to bear at two and three years, and continue to bear normally until 10 to 12 years of age. If the pruning is done with sufficient skill and about three-fourths of the new wood growth cut away each year, it is possible to preserve the tree for twice or three times that period.

Peach orchards yield excellent profits, from $300 to $600 an acre being a fair average.

Plums and Apricots.

Plums, peach plums, nectarines and apricots are successfully grown in Oregon for local consumption. As the conditions are not essentially different from those discussed under the prune and the peach, these fruits will not be given extended consideration.

Strawberries and Other Berries.

Climatic and soil conditions in Oregon are eminently favorable to the production of berries of every kind. In size, quality, abundance and earliness of production, they are never surpassed. The California small fruits and berries, of course, reach the market earlier, but as soon as the Oregon product appears it is given the preference.

Of strawberries, the varieties include the Clark's Seedling, Magoon and Gold Dollar. The first mentioned excels all others in acid and in sugar. It originated in Oregon, and is especially identified with the Hood River district, but is successfully grown all over the State. The others are execeptionally large and very prolific.

In some sections of Oregon strawberries are picked before May

first. By May 10th and 15th the vines are fully productive. Clark's Seedlings bear from 30 to 40 days; others from May to October. Second crops are often picked up to the first of November. Clark's Seedlings produce from 2000 to 2400 lbs. to the acre; Magoons from 6000 to 10,000 lbs. per acre.

Excellent profits are derived from strawberries. The cost of production is put at $1 a crate, and prices range from $2 to $5 a crate. $250 an acre is a conservative figure for net returns.

Other berries include the black and red raspberry, phenomenon berry, loganberry, dewberry, gooseberry and currant. All find conditions to their liking and produce prolifically after their kind. These are sold locally and find a ready market at prices that represent excellent profits for the grower. Loganberries are dried in an evaporator and shipped to the East for pie making purposes. Twenty cents a pound is secured.

Cranberries.

Cranberry culture in the United States has been largely confined to a few limited districts on the Atlantic Coast. Not a great many years ago, however, experiments were made in raising cranberries in the marshy districts along the Pacific Coast in Oregon. These were entirely successful and the industry has been put upon a commercial basis. As yet the bearing acreage is small, but the suitability of soil and climate has been thoroughly demonstrated. The berry compares favorably with the Eastern product and commands a ready sale. Vines were imported from Cape Cod and brought with them the larvae of the vine worm and fruit worm. Although these were hatched and were in evidence the first year, they disappeared the second year and have not since put in an appearance. Suitable marsh land can be bought for from $50 to $150 an acre. The vines bear two-thirds of a crop the third year and a full crop the fourth. $200 an acre net has been taken annually from well-established cranberry marshes. Practically all of the land suited to the cranberry is at present more or less distant from lines of transportation, and with the construction of projected lines in the coast counties, a large development of this profitable industry is sure to result.

Grapes.

The first grape vine grown in Oregon was an Isabella and had a place in the primitive orchard of Henderson Luelling. It was some time, however, before grape culture was undertaken commercially. Up until a very few years ago, Oregon was dependant for its American grapes upon the East and for its European varieties upon California. Now it is but rarely that a car of grapes is received from the East, and the shipments of California grapes are growing steadily less. At the present rate of development, it will be but a measurably short time until Oregon is able to supply not only its own demand, but that of Puget Sound, British Columbia and other markets as well. Even California, in which no Concord grapes are grown, presents an available market for grapes of that popular variety. Moreover, it is entirely practicable to ship to the East the European grapes grown in Oregon vineyards.

The adaptability of certain sections of Oregon to viticulture has been well established. Vineyards may be found that have produced grapes in commercial quantities for over 20 years. Just now it is probable that the acreage of the American varieties exceeds that of the European; but as the plantings in recent years have been mostly of the delicate Mediterranean grapes, it is apparent that they will soon take precedence.

There are two sections of the State in which grape culture has been given special attention. These are the Rogue River Valley in Southern Oregon and the Upper Columbia region. In the first, grapes are cultivated without irrigation; in the second, irrigation is indispensable. Equal success has been attained in both districts. Other sections are well adapted, however, including practically all of Western Oregon. Hillsides with a southern exposure are usually selected as sites for vineyards. An elevation between 200 and 1000 feet is preferred and places in which there is lack of drainage or free air movement are avoided. New ground or sod is well fitted, and one-year-old vines are set, from 50 to 800 to the acre. Thorough cultivation is practiced throughout the life of the vine. During immaturity, the young vines are pruned back vigorously. Substantial stakes are set to support the vines.

All of the standard American grapes are grown, with the justly popular and reliable Concord in the lead. Of the European varieties, the Flame Tokay, Muscat and Malaga are given preference with some Cornishons and Black Hamburgs.

Of the fungous and insect pests the aphis is not troublesome. The green grapevine sphinx and the cutworm are kept in check by the birds. The dreaded phylloxera has not yet appeared. Anthracnose, grape rot, rust, grape knot and mildew are effectively controlled by spraying.

A small crop is borne the third year; a full crop the fourth. The grapes are picked when well ripened and packed in four-box crates, or four and eight-pound baskets. Prices range from 50 cents to $1.65 a crate and from 10 to 20 cents and 20 to 45 cents, respectively, for the baskets.

In quality, the Oregon grape will please the most critical. The clusters are large and symmetrical, the berries large, unblemished, of good color and keeping quality. This excellence is especially notable in the delicate Flame Tokay, which attains an unusually high color and develops a superior hardihood that recommends it to the shippers.

Excellent wine and even champagne have been made from Oregon grown grapes, and there are great possibilities in the development of this phase of the industry.

Grape culture in Oregon is as yet in its youth, and is susceptible of great expansion. The superiority of the product, its excellent shipping qualities and the proximity of good markets combine to produce evident advantages. Oregon grapes are destined to appear in Eastern markets alongside of Oregon apples, Oregon pears and Oregon cherries.

Walnuts.

Although not exactly a fruit, consideration of the walnut finds a place in this bulletin as one of the tree products that have been succesfully grown in Oregon. Of them all, it is probably the latest to receive recognition; yet it is doubtful that any one has a brighter future. The production of walnuts in the United States is at present confined almost entirely to California and amounts to about 15,000,000 pounds a year. The consumption of walnuts in the United States is three times that amount, and is steadily increasing. As the increase in California is very slight, and suitable land is held at very high prices, it would seem that unusual success should follow the development of the industry in any region that can produce nuts of the requisite quality.

Walnuts were planted by early settlers, much as they planted seeds of other kinds—without definite knowledge of their nature or the conditions best adapted to their growth. Unconsciously they were doing experimental work that was invaluable. From this early planting, it was observed that the trees grown from nuts from Chile or California produced but rarely, while the trees from German or French varieties were almost invariably fruitful. From this, and from further tests, it has been well established that the French nuts are the best adapted to the conditions in this State, and the Mayette and Franquette are now given the preference.

In 1896-98 the first large grove was planted, and since then the acreage has steadily increased. The walnut planter seeks a high elevation, well above the frost line. Depth of soil is essential. Ten feet of good soil without sand or gravel is required, with a good drainage even beneath that depth. There has been considerable controversy as to the relative merits of seedling and grafted trees. With seedlings there is always some uncertainty that the tree will produce nuts of the kind and quality of the original. With the grafted tree, this uncertainty is eliminated. However, grafting is difficult and expensive, and for that reason a majority of seedling trees are used. Fortunately, the French varieties follow very closely the type of the parent tree. Top grafting at three or four years is often practiced.

As the walnut tree attains great size, sufficient space is necessary to permit proper development, and not over 25 are set to the acre. The ground between the trees is commonly put to other use. Cultivated crops, berries or small fruit can be used. Peach or cherry trees are cut out when they interfere with the development of the walnut. Vetch as a winter cover crop is sown and worked into the soil in the Spring.

The walnut trees require but little care, comparatively, as there is but little pruning and but little, if any, spraying. Heavy stakes are often used to support the young tree and promote the development of a shapely head.

Trees begin to bear nuts at four years, but commercial production is not reached until the tenth or twelfth year. The nuts ripen in October. Harvesting is accomplished by whipping the branches with long poles, or, preferably, by jarring the limbs with a padded mallet. As

all of the nuts do not ripen at the same time, it is necessary to repeat the operation several times. The next step is washing, for which the dipping aparatus of a prune dryer is well adapted. The prune dryer may be used, also, for drying the nuts, for which a temperature of 85 degrees Fahrenheit is sufficient. Bleaching is not practiced in Oregon, as it is considered an unnecessary operation, adding nothing to the value of the nut.

As nearly as can be determined, an average yield from a well-established grove is 1000 pounds a year. So far, Oregon nuts have brought premium prices. A profit of $100 an acre is perhaps too conservative a figure. But considering the dependability of the crop, its perpetuity, and the comparative freedom from annoying details of management throughout a great portion of the year, an Oregon walnut grove represents one of the most satisfactory investments that a man can make.

Some General Considerations.

Aside from apples, pears and prunes, the production of fruits and nuts in Oregon for foreign shipment—i. e., to Eastern, European and other markets—is of recent development. To bring them to a satisfactory commercial stage, co-operative effort is necessary. To grow fruit of a high quality is only half the battle—the larger half, no doubt; but there still remains much to be done. Methods of packing must be developed, a high standard must be established for the product by strict grading and the rejection of all inferior fruit. Pre-cooling plants are necessary for the more perishable. By-products must be utilized. Problems of transportation must be solved, buyers interested and markets found. A production large enough to make shipments in carload lots is almost indispensable. The solution of these problems is merely a matter of effort, but it must be **combined** effort. That is the reason why certain sections like Hood River and Medford have achieved such signal success. Associations in these and other districts control the fruit entirely. Picking, packing, marketing, etc., are all done by the association, and buyers know that by coming to the association they can secure large quantities of fruit that reaches a prescribed standard. They pay the top prices and pay them gladly.

There are thousands upon thousands of acres of land in Oregon suitable for certain kinds of fruits and nuts. They can be bought for reasonable sums and, by the exercise of intelligent effort and a little patience, transformed into magnificent dividend-paying properties.

The bugaboo of over-production should be forever banished. The total production of fruit in the United States has steadily fallen off for a number of years and there is no considerable effort to re-establish commercial orchards outside of the Northwest. Moreover, the advantages that the horticulturist enjoys in this section are so great that he can practically defy competition. His market is the world. And even if the price level does decline a little from the height of the last few years, the income-producing capacity of the commercial orchard in Oregon will hardly be affected.

Any additional or specific information regarding Portland or Oregon will be supplied upon writing to the Portland Chamber of Commerce, 69 Fifth street, Portland, Oregon.